NEW NAME, NEW LOGO (see page 20)

CHEMICAL HERITAGE

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The History of Chemistry Summer Workshop

Fifty high school teachers from all parts of the country gathered at Princeton University on the last evening of the 4 July weekend, for the first Chemical Heritage Foundation–Woodrow Wilson summer institute on history of chemistry. The four-week program was directed by Purdue's Derek A. Davenport with assistance from CHF's Associate Director Lawrence B. Friedman; its aim was to present chemistry's historical background—from its alchemical beginnings to our own time—so that it could be used in the classroom to enrich as well as to clarify the subject matter of chemistry.

The principal lecturers, apart from Davenport, were William Jensen (University of Cincinnati), on the development of the periodic table; Theodor Benfey (CHF), on the rise of organic chemistry and on the use of modular origami for learning three-dimensional geometric relations; John Kenly Smith, Jr. (Lehigh University), on Wallace Carothers and the development of the plastics industry; and Jeffrey L. Sturchio (Merck & Co., Inc.), on the growth of the chemical and pharmaceutical industries. Diane L. Gerlach (Tremper High School, Kenosha, Wisconsin) and David Olney (Lexington High School, Massachusetts) were in charge of the laboratory and computing activities.

The workshop will lead to the creation of several lesson modules, which the Woodrow Wilson Foundation will then publish for the teachers to disseminate in various presentations and activities in their home regions. The teachers transcribed six of Michael Faraday's

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CHF—Building the Future, Using the Past

"CHF'S OPPORTUNITIES AND RESPONSIBILITIES are great and increasing." That is why the Chemical Heritage Foundation (CHF), explains Charles C. Price, the chairman of its board, has spent the last several months refining its mission, restructuring its operations, and reviewing plans and progress. "The Chemical Heritage Foundation is destined to play a growing role in the chemical community as that community draws on its proud history. It will also play an increasing role in the community at large, as public understanding of science and technology becomes ever more urgent in our ever more interdependent world, which must make ever more effective use of limited resources."

It was in 1982 that an initiative within the American Chemical Society prompted the creation of the Center for the History of Chemistry. That initiative, in which the American Institute of Chemical Engineers soon joined, led to the incorporation of the National Foundation for History of Chemistry (predecessor to CHF), the emergence of the Beckman Center for History of Chemistry, and the first exciting plans for an Othmer Library of Chemical History. Extensive discussions within the executive, finance, and development committees of the CHF have resulted in a new strategic plan. Sheldon E. Isakoff, vice chairman of the Foundation board, describes it as "a strong plan, because it addresses our *programs*, our *facilities*, and our *funds*. And it will allow us to recognize and respond to the growing importance of the chemical sciences to health, to material prosperity, and to deeper understanding of our physical world."

The programs of the Chemical Heritage Foundation will be grouped under three heads. The Beckman Center for the History of Chemistry (BCHOC), a unit of the University of Pennsylvania funded by CHF, will continue to emphasize basic research, scholarly publication, and the building of a strong chemical presence in the world of academic history. The Othmer Library of

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FOUNDING SOCIETIES: AMERICAN CHEMICAL SOCIETY ■ AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

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CHEMICAL HERITAGE FOUNDATION

THE CHEMICAL HERITAGE FOUNDATION (CHF) was established by a joint action of the American Chemical Society and the American Institute of Chemical Engineers. Affiliated societies include Alpha Chi Sigma, The American Association for Clinical Chemistry, Inc., the American Association of Textile Chemists and Colorists, the American Society for Biochemistry and Molecular Biology, the American Society for Mass Spectrometry, The Chemists' Club, The Electrochemical Society, Inc., and the Société de Chimie Industrielle.

CHF seeks to put our chemical heritage to work by discovering and disseminating information about historical resources; encouraging research, scholarship, and popular writing; publishing resource guides and historical materials; conducting oral histories; creating traveling exhibits; and taking other appropriate steps to make known the achievements of chemical scientists and the chemical process industries.

CHF operates through public outreach programs and through the Arnold and Mabel Beckman Center for the History of Chemistry and the Donald F. and Mildred Topp Othmer Library of Chemical History.

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CORPORATE HISTORY

Phillips Petroleum Company

Phillips Petroleum Company has records encompassing more than seventy-five years of company history, and in February 1991 it established a corporate archives to hold them. The collection traces the company's accomplishments and its relations with employees, clients, labor, government, and the communities in which Phillips operates, and it contains documents dating back to the early 1900s, when Frank and L. E. Phillips first entered the oil business.

The environmentally controlled repository (1,500 square feet) holds company publications, organizational charts, advertisements, oral histories, an extensive photograph and negative collection, executive speeches, press releases, and biographical files. In addition, a public reference area displays company artifacts, as well as books about the company and its founders and on the history of the petroleum industry.

Phillips is the only major oil company that today retains the name of its founders. The brothers incorporated Phillips Petroleum Company on 13 June 1917, with assets of $3 million and twenty-seven employees. Frank Phillips realized early in the company's history that research was the key to its future. In 1927 he recruited some of the nation's leading scientists to establish one of the world's first hydrocarbon research laboratories. This was a time when the industry was still being run for the most part by "rule of thumb."

The research done by the "whiz kids" he hired led to distinctive advances. They devised an innovative way to process natural gas liquids, of which Phillips has long been the nation's largest producer; pioneered the liquefied petroleum gas business; invented processes critical to the manufacture of high-performance aviation gasoline during World War II; discovered revolutionary plastics; and made technological history by finding a way to drill for oil and gas in the hostile environment of the North Sea and to bring them up from those deep waters. These important events are documented in the archives.

Susan Box, a certified archivist, manages the archives, which she was instrumental in establishing. The archives are open to all employees and by appoint-

HEADQUARTERS
for
100 OCTANE
Aviation Gasoline
Phillips 66
Research begins . . .
not in a test tube . . .
but in the mind of a man.
FOR VICTORY... Buy U.S. War Bonds and Stamps

The Phillips process discoveries resulted in production of 100-plus octane aviation gasoline, a significant contribution to winning World War II. This ad from 1944 features the role played by the Phillips researchers.

ment to outside researchers. For information contact Corporate Archives, C20 PB, Phillips Petroleum Company, Bartlesville, OK 74004; (918) 661-7326.

SUSAN BOX
Phillips Petroleum Company

Nalco Chemical Company

The story of Nalco Chemical Company really began in 1922, when Herbert A. Kern of Chicago Chemical Company and P. Wilson Evans of Aluminate Sales Corporation first met. Both companies were selling sodium aluminate to treat water fed to boilers: Chicago Chemical sold predominantly to industrial plants and municipalities, Aluminate Sales to railroads for steam locomotives.

Chicago Chemical, founded in 1920, did well for a time with its original water treatment compound, "Colline." When the company tried to extend sales to other parts of the Midwest, however, it found Colline did not always work. To remedy its shortcomings, Kern investigated the merits of sodium aluminate. His research led to the marketing of what he called Kern's Water Softener (K.W.S. Sodium Aluminate).

Wilson Evans discovered the benefits of sodium aluminate as an employee of the Engineering Department of Armour and Company, whose principal business was meat packing. Evans found that the efficiency in Armour's power plants increased if the water used in steam boilers was treated with sodium aluminate. The method proved so successful that it was introduced in Armour's plants throughout the United States.

Evans suggested that Armour move into boiler water treatment, but the firm decided not to market something so unrelated to its basic business. In 1922 Evans secured permission from Armour to form an independent operation to sell sodium aluminate.

Evans and Kern both held patents on sodium aluminate solutions, and it was inevitable that they should meet. At first Kern sought out Evans because he needed another source of the product for his own water treatment business. Within a few years, however, the sodium aluminate for both companies was manufactured at a plant erected in 1926 by Chicago Chemical Company in the Clearing Industrial District of Chicago.

In early 1927 Evans and Kern began to explore the advantages of a merger. They also approached the Aluminum Company of America, which dominated the U.S. market for bauxite, the essential raw material for manufacturing sodium aluminate. A proposal to consolidate resources was developed in a meeting with Arthur Vining Davis, president of ALCOA. In 1928 National Aluminate Corporation (later known by the contraction "Nalco") was incorporated and inherited the entire business of Chicago Chemical and Aluminate Sales. In exchange for 27.5 percent of its capital stock, Nalco received certain United States patents held by ALCOA and its municipal water-treating accounts. What began as a small, two-division company manufacturing a single product is today the world's largest producer of specialty chemicals and services for water and waste treatment, pollution control, petroleum production and refining, papermaking, mining, steelmaking, metalworking, and other industrial processes.

In 1982 Nalco's president sent a letter to its long-service employees, both current and retired, requesting donations of historical materials and anecdotal information for a company archives. It was the formal beginning of Nalco's endeavor to preserve its past. The employees responded enthusiastically. A complete collection of the company newspaper, *Nalco News* (published since 1936), was compiled, and a variety of company artifacts acquired. The collection includes advertisements dating back to 1922, news releases, technical manuals, speeches and correspondence, organization charts, company reports, product bulletins and brochures, catalogs and price lists, employee handbooks, flow charts, chemical test kits, and early payroll records. Another valuable donation was a comprehensive thirty-seven-volume set of photographs and negatives

Continued on page 21

A 1936 advertisement for a Nalco consumer product using ion-exchange resins.

DISHES
BATH
SHAMPOOING
Soft WATER for Every Home
Two Sizes to Fit Every Home Only
$3.50
AND
$7.50
PORTABLE SOFTENER BANISHES HARD WATER
Now, thousands of homes are enjoying the luxury of really soft water. The Nalco Softener does away with hard water or the need for breaking chemicals and soon pays for itself in soap savings alone.
THE Nalco Water Softener is so portable, LOW IN PRICE and softens hot or cold water so quickly and efficiently that every home can have plenty of soft water for laundering clothes, washing dishes, cooking, shampooing, baby's tub, etc. Nothing is added to the water for hardness is removed by Nalcolite (which does NOT DISSOLVE) and softened water is recommended by doctors. The Nalco Softener gives years of service.
Ask your dealer about this wonderful, portable softener or write for full information, sent free.
National Aluminate Corp.
6216 W. 66th Place, Chicago, Ill.
NALCO
Portable
WATER
SOFTENER

NEWS from the Arnold and Mabel Beckman Center for the History of Chemistry

The Beckman Center is sponsored by the Chemical Heritage Foundation and the University of Pennsylvania. The Center is an academic unit of Penn, working closely with the Department of History and Sociology of Science and with the Departments of Chemistry, Chemical Engineering, and Biochemistry and the Laboratory for Research on the Structure of Matter. The Center's mission is to undertake scholarly research, publish materials on the history of the chemical sciences, support senior-level and graduate fellowships, and conduct a variety of scholarly events of interest to the academic community.

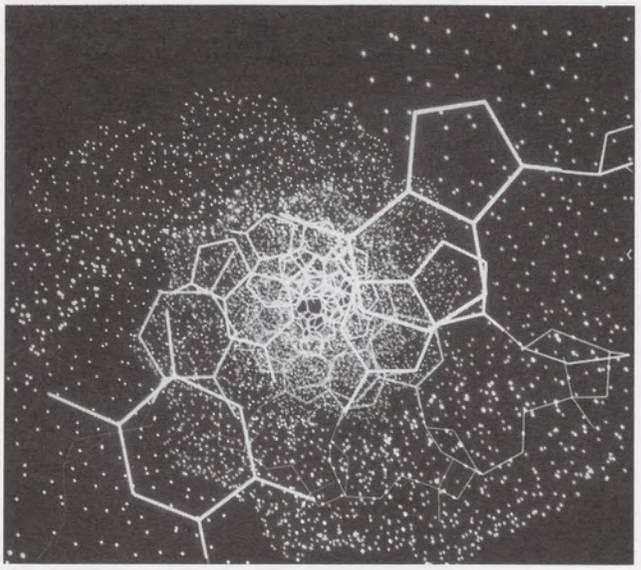
The BIMOSI Human Genome Project

Making sense of the Human Genome Project—as science, politics, ethical dilemma, and historical "event"—was the core problem discussed at the Beckman Center's May BIMOSI advisory committee meeting. Advisers to the Center's Biomolecular Sciences Initiative—scholars, scientists, archivists, and one "consumer" of genetic information (Priscilla Ciccariello, chair of the National Marfan Foundation)—came together for a lively two-day discussion of the effort to map the human genome and of the Beckman Center's study of this effort. The group agreed that the Center plan to develop a documentation strategy for the genome project was a crucial contribution to scholarship, public understanding of the project, and science policy analysis.

But our advisers had varying perspectives on precisely what made the Human Genome Project and the Beckman Center plan important. Some, such as the Rockefeller University biologist Norton Zinder and the Case Western Reserve ethicist Thomas Murray, emphasized the need to capture information immediately about the (intentionally) unrecorded planning meetings that have shaped the development of the genome project, its funding and its acceptability to Congress. Murray pointed to the unprecedented 3 percent of the overall HGP budget set aside for studies of ethical, legal, and social issues relating to the project. He expressed concern about the effect this funding could have on the community of biomedical ethicists, who have previously found little federal support for their research. Stephen Hilgartner, a sociologist at the Columbia Center for the Study of Science and Medicine, urged that the Beckman Center attend more to the international effort, since the U.S. project cannot be understood in isolation, as he discovered in the course of his own work on technologies for mapping genes. In response to concerns about the availability of the records of private industry, Jeffrey L. Sturchio, Merck's corporate archivist, noted that many corporations are already preserving—for their own purposes—the industrial records that will be crucial to understanding the story of the Human Genome Project. Victoria A. Harden, an NIH archivist, pointed out that historians and others interested in corporate science need to become more aware of the records that appear in less conventional archival collections, such as court records and patent applications. From a different perspective Priscilla Ciccariello emphasized the enthusiasm of members of volunteer health organizations for the genome project and their general expectation that its findings will benefit those suffering from genetic disease.

The group enthusiastically endorsed the Center's draft "Observer's Guide to the Human Genome Project," to be published by the Beckman Center and made widely available to journalists, high school teachers, and others who need a clear, concise introduction to the genome project. Compiled by Susan L. Speaker of the University of Pennsylvania's Department of History and Sociology of Science, the guide features short biographical sketches of key players, descriptions of molecular-biological techniques, a short explanation of the project's history and goals, a listing of important scientific resources and systems of communication, and a summary of ethical, legal, and social questions raised by the project.

Participants also responded to an outline by Elizabeth Sandager, CHF field archivist, of some immediate documentation problems she identified in a series of site visits to genomics laboratories. These problems included the changing nature of "documentation," for example, the increasing importance of e-mail and other electronic records, the multi-institutional nature of the genome project, and the complex relationships between private industry and academic laboratories. Conference participants suggested that a documentation strategy should focus on aspects of the genome project that are likely to be left undocumented (such as some aspects of the biotechnology industry); that the public impact of the project might be ad-



A computer-generated image of the DNA double helix, looking down the helical axis. Modeling and photography by Arthur J. Olson. Courtesy Arthur J. Olson and the Scripps Research Institute. © 1985

dressed by preserving the records of disease-specific patient groups (the volunteer health organizations); and that a focused oral history program should be undertaken to help supplement the written record, particularly for those activities that have been intentionally kept off the record.

The meeting was extremely productive for the Beckman Center team and will shape BIMOSI's emerging documentation strategy. It was funded with a grant from the Andrew W. Mellon Foundation as a part of the Center's BIMOSI initiative.

Other members of the advisory committee attending were Richard Burian, National Humanities Center; Mildred Cohn, University of Pennsylvania; Clark Elliott, Harvard University Archives; Beverly Emanuel, Children's Hospital of Philadelphia; Nancy McCall, Johns Hopkins Medical Institutions; William Summers, Yale University School of Medicine; Kenneth F. Thibodeau, National Archives; and Joan Warnow-Blewett, American Institute of Physics.

CHF Exhibits on the Road

Our traveling exhibits are becoming widely known, and reservations need to be made early. The only cost is that of return shipping. Write to Exhibits at the Chemical Heritage Foundation.

Exhibit itineraries for 1993 are as follows:

Polymers and People
1 December 1992–31 January: Savannah Science Museum, Savannah, GA
April: Syracuse University, Syracuse, NY
22–27 August: ACS National Meeting, Chicago, IL

Scaling Up
February: Science Museum of West Virginia, Roanoke, VA
April: University of Rhode Island, Cranston, RI
November: Marathon Oil Company, Littleton, CO

Structures of Life
1 December 1992–15 January: University of Texas, Austin, TX
1 February–15 March: Pharr–San Juan–Alamo, San Juan, TX
25 March–25 April: East Stroudsburg University, East Stroudsburg, PA
15 September–31 October: University of Tennessee, Martin, TN
November: AIChE Fall National Meeting, St. Louis, MO

Woodward and the Art of Organic Synthesis
1 March–30 April: University of Tennessee, Martin, TN
13–17 June: ACS National Organic Symposium, Bozeman, MT

Some of the participants at the Woodward festivities, from the left: Charles C. Price, CHF; John C. Haas, Rohm & Haas; Mark A. Wuonola, Du Pont Merck Pharmaceutical Co.; Frank H. Westheimer, Harvard University; Harry H. Wasserman, Yale University; Crystal E. Woodward, Lacoste School of the Arts; Roald Hoffmann, Cornell University; Joseph Dixon, American Chemical Society; and Arnold Thackray, director, CHF. Courtesy Stuart Borman and Chemical & Engineering News.

Reminiscences of the International Woodward Symposium

At first we expected fifty for the symposium banquet, and planned to decorate each of five tables with a model of one of the molecules RBW had synthesized—quinine, strychnine, penicillin, reserpine, chlorophyll—models with the polyhedral atoms that would have appealed to his aesthetic sense. But the count of diners rose to 100—then to 150—and finally approached 200, leading to further rapid syntheses!

Among highlights of the event were the reminiscences of Harvard's Frank H. Westheimer, who spoke movingly of his friend and colleague Woodward, and the speech of Albert J. Eschenmoser, architect with RBW of the vitamin B_{12} synthesis. Eschenmoser gave the audience the flavor of RBW-type research, presenting, as Amos Smith (University of Pennsylvania) put it, pyrotechnics—a brilliant demonstration of synthetic theory and practice at its finest. Eschenmoser's topic was hexose nucleic acids, and he explored the effect of replacing the five-ring pentose sugars in DNA by hexoses. The base-pair rungs of the ladder remain intact, but the ladder is flat, no longer a helix.

Arnold Thackray's opening slide lecture at the University Museum, "Organic Connections: Perkin to Woodward," explored the many chemical strands linking William Henry Perkin's attempt to prepare quinine forty-four years before 1900 with Woodward and William von E. Doering's successful quinine synthesis forty-four years after the century's turn. Beginning with Perkin's mentor, A. W. Hofmann, and that mentor's mentor, Justus Liebig, the lecture surveyed the professionalization of chemistry, the development of chemical industry, and the establishment and growth of chemistry in America. Paralleling that social history was the saga of chemical ideas: from the jungle that the organic world presented to early chemists; through early syntheses, by chance and then planned; to the halting path to the structural theory, electronic interpretations, and the flowering of physical organic chemistry—culminating in Woodward and Roald Hoffmann's promulgation of the rules for conservation of orbital symmetry in electrocyclic reactions.

In the session on art and creativity, RBW's daughter Crystal Woodward, who teaches at the LaCoste School of the Arts in southern France, pointed to the artistic in Woodward's work. The molecular world was his landscape, and absorbing himself in it had a transmuting effect on him. He saw molecules as dynamic and visualized them in endless ways, yet he always emphasized the physical restraint imposed on his imagination by reality. His quickly drawn diagrams on manila papers have the qualities of works of art, as did the blackboard displays of structures and reactions in his lectures. He sought beauty and elegance in the paths to his syntheses. The speaker drew parallels between her father's approaches and her own work as an artist, identifying elements from her experiences which she then integrated into a harmonious whole. Roald Hoffmann of Cornell—poet and art connoisseur as well as chemist—briefly shared his own reflections on the theme of chemical art and creativity.

Continued on next page

RBW's daughter-in-law Hilary, son Eric, daughter Crystal, and widow Eudoxia joined in the Woodward celebrations.

Alfred Bader at the Woodward exhibit. After participating in the symposium, Bader spoke to the chemists at Penn on Josef Loschmidt (1821–1895) and his pioneering "Konstitutionsformeln" (right) of 1861.

WOODWARD—*continued*

In the next session, attention turned to the links between chemistry and industry, specifically the pharmaceutical industry. George M. Milne, Jr., senior vice president at Pfizer Inc., spoke on "The Central Role of Synthetic Chemistry in the Academic-Industrial System of Biomolecular Science and Drug Discovery." He recalled RBW's appreciation of Marcelin Berthelot's comment of 1860: "Chemistry creates its object. This faculty, similar to that in art, distinguishes it in essential ways from the natural and historical sciences." He reminded his audience of Woodward's collaboration with Pfizer chemists in their work on terramycin and the tetracyclines. He then explored the present state of chemistry and its prospects, particularly in the biomedical field, drawing insights from Pfizer's work with renin and spider venoms. He ended with RBW's own words: "The evidence is overwhelming that the creative function of organic chemistry will continue to augment nature, with great rewards for mankind and the chemist in equal measure."

John L. Zabriskie, senior vice president of Merck & Co., Inc., chose as his provocative title "Research in the Real World." He indicated the many links Merck had with RBW, particularly through Max Tishler and Lewis Sarett, friends of RBW and successive presidents of Merck research, as well as through students and colleagues who moved to Merck. Using examples from his experience at Merck, Zabriskie pointed to the key roles chemists play today not only in discovery and synthesis, process design, and development, but also in addressing questions relating to safety, environmental protection, personnel, and management.

From the Symposium . . .

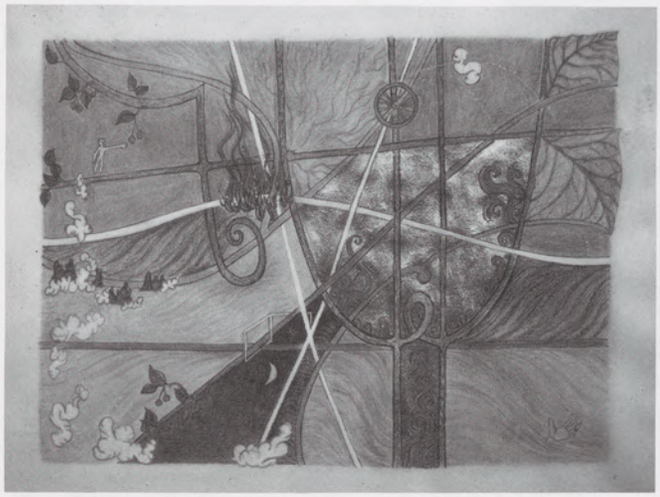
Nothing fails like success. The European chemists and their followers were so delighted with their accomplishments that they were locked into the past; they failed to look for—no, they actively rejected—considerations of mechanism, and so failed to advance the art of synthesis. Then Woodward stepped into this intellectual vacuum, and showed a better way. . . .

Bob insisted on the highest level of experimental work from his coworkers. For example, to guard against error or even any sloppiness in preparations, he demanded that infrared spectra, designed to show the identity of two samples, agree within the width of the pen lines on the charts—a demand that sent his students looking for broad pens.

Bob's results also stem from enormous effort. In the final productions—the beautiful syntheses, the brilliant deductions of structure, the polished lectures—the rough places have all been sanded down and polished so that they don't show; everything looks straightforward, even inevitable. But Woodward himself slept only three or four hours a night; he was in his office early and stayed late at least six days a week. If one calculates that he utilized a sixth of the day lesser mortals waste sleeping, he really lived to seventy-three, not sixty-two. And he was always intellectually hungry; his own great accomplishments failed to satisfy him. . . .

From RBW's Cope Award Address

In chemistry one's ideas, however beautiful, logical, elegant, imaginative they may be in their own right, are simply without value unless they are actually applicable to the *one* physical environment we have—in short, they are only good if they work! I personally very much enjoy the very special challenge which this physical restraint on fantasy presents.—Courtesy Harvard Archives



Crystal Woodward, "The Landscape of the Hand" (1979), colored pencils and ink on paper. Created through her "Visual Language" system, in which images are formed by combining separate "molecular" elements, the work evokes RBW's thought processes and the aesthetic pleasure he took in his art in chemistry.

Woodward's own lectures are famous, or perhaps notorious would be a more suitable adjective. Until late in his career, he abjured slides and relied on colored chalk and his memory for detail. He would start in the upper left-hand corner of a large blackboard and present his synthesis, ending at the lower right-hand corner with a display that would have been perfect for publication. Every square inch of the board was covered neatly with elegant formulas, and the whole performance presented casually, as if everything naturally turned out that way. In fact, his lectures had been carefully rehearsed.—**Frank H. Westheimer** (Harvard University)

Robert and I met when he was twelve and I was fifteen. I already had a home lab, and he heard about it and started his own. He invited me over to see what was apparently his first experiment. He proposed to make hydrogen gas. On a card table he had some solid reagents and a large Erlenmeyer flask fitted with a thistle tube and an exit tube. He poured in some hydrochloric acid on the zinc in the flask. Before I could stop him, he ignited the issuing gas. A big explosion occurred, smashing the equipment and the bottles of reagents. We were not hurt and washed ourselves off and cleaned up the mess. This experiment sealed our friendship. I noticed that his mother, who was present, did not complain nor seem disturbed.—**Robert C. Putnam** (Mountain Lakes, New Jersey)

Another Opinion

In 1963 a senior Stanford professor tried to explain the singular phenomenon of Robert Burns Woodward:

Woodward . . . was a problem to many, if not to most, of his colleagues in organic chemistry. If they happened to be in Boston and dropped by R.B.'s office at Harvard for a friendly chat, they sometimes mentioned a chemical problem which had been occupying their minds. R.B. looked at the problem and . . . quite often presented a convincing solution within a few minutes. This had the result that these colleagues, after they left R.B., were hopping mad with themselves, wishing they had continued pondering their problem for some additional days or weeks to find the solution by themselves.—**Helmut Vorbrüggen** (Schering AG, Berlin). From an *Aldrichina Chimica Acta* reprint, 1992.

This cookbook for users of Liebig's meat extract warns its readers that the extract is the genuine product only if Liebig's signature in blue ink appears on it. Courtesy Elisabeth Vaupel.

Liebig and Erlenmeyer, Industrialists: Studies at the Center

During my three months at the Beckman Center, I explored several examples of cooperation between scientific chemistry and the chemical industry during the nineteenth century. It is well known that initiatives taken by chemistry professors helped many industries develop and diversify. The professors in turn improved their salaries considerably by acting as advisors to, or even as silent partners of, chemical plants. I focused on two German chemists, Justus von Liebig (1803–1873) and Emil Erlenmeyer (1825–1909), whose personal papers contain rich material.

Liebig took an active part in various chemical enterprises, for example, a mirror-silvering plant in Doos, near Nuremberg, and a fertilizer plant in Heufeld, Bavaria. I looked at Liebig's role and financial interests in the Liebig's Extract of Meat Company, in Fray Bentos, Uruguay. The factory was founded in 1865 and ceased operation in 1981, but it still exists; plans are currently under way to use its historic buildings as an industrial museum. During the 1850s Liebig carried out intensive studies on food and nutrition. After his research on the ingredients of meat and muscle fibers, Liebig, basing his work on studies by Joseph Louis Proust and Antoine-Augustin Parmentier, developed an efficient method of manufacturing meat extract from different sorts of meat. He vigorously promoted it as a restorative for wounded soldiers, claiming they would have a better chance of surviving the transport to a hospital if strengthened by the meat extract.

Liebig and the German-Brazilian engineer Georg Giebert decided to manufacture meat extract in Uruguay, as a way for Europe to exploit South America's cattle population. Food production and distribution were a major problem at that time, especially in the large European cities. Since today's methods of transporting and conserving meat (refrigerator ships, etc.) were still unknown, Giebert and Liebig's plan was received with enthusiasm, and in 1865 a company bearing Liebig's name was founded—the Liebig's Extract of Meat Company, Ltd., with various branches in Europe (Antwerp, London, Cologne). The parent company in Fray Bentos pro-

Continued on next page

RBW Exhibit Begins Travel

The traveling exhibit "R. B. Woodward and the Art of Organic Synthesis" opened in the Museum's Egyptian Gallery for the occasion of the Woodward symposium. John Haas of Rohm and Haas paid special tribute to Alfred and Isabel Bader for the vision and inspiration that made the exhibit possible. Mark Wuonola of Du Pont, a Woodward doctoral and postdoctoral student, recalled RBW's highest commendation for tasks well done—"carried out in the manner *expected* of members of my group"—and suggested that the exhibit also had that quality. He hoped it would help future generations of scientists experience RBW as a mentor.

The exhibit moved to the Beckman Center after the symposium and then to the fall ACS meeting in Washington, completing the year at Pfizer, Du Pont, Eli Lilly, Merck & Co., and Harvard. For future showings see p. 5.

Liebig's meat extract was produced in Fray Bentos, Uruguay. Courtesy Elisabeth Vaupel.

LIEBIG—*continued*

duced not only meat extract but also other products such as fertilizer, soap, leather, and corned beef, thus making use of production residues—bones, hoofs, skin, and meat. Liebig, who was responsible for controlling the quality of the meat extract, spared no effort in promoting the sale of the product. For example, he convinced famous German cookbook authors to write recipes that worked only when Liebig's meat extract was used. Furthermore, he gave "his" meat extract as a present to nearly every friend as well as serving it to his guests.

Erlenmeyer also had industrial connections, primarily with a small chemical plant in Ödenwald, Württemberg, directed by his friend Hans Weidenbusch. Erlenmeyer invested several thousand gulden in the enterprise and received 10 percent of the profits. In connection with his work for the firm Erlenmeyer was in close contact with Carl Clemm-Lennig (1818–1887), well known as one of the founders of the chemical industry in Mannheim. Clemm-Lennig in turn was related by marriage to Charles Lennig, owner of a chemical plant in Bridesburgh near Philadelphia.

ELISABETH VAUPEL
Deutsches Museum, Munich

GRANTS & AWARDS

Kathryn Steen Is First Edelstein International Student

Kathryn Steen, a graduate student in the University of Delaware's Hagley program in the history of technology, is the first holder of the Edelstein International Studentship, created by Sidney M. Edelstein of the Dexter Chemical Corporation as a companion program to the Edelstein International Fellowship. Steen will complete her dissertation on the development of the United States synthetic organic chemicals industry, working first at the Beckman Center, then at the Sidney M. Edelstein Center for the History and Philosophy of Science, Technology, and Medicine in the Hebrew University of Jerusalem.

Although the United States was a major industrial power on the eve of World War I, it was weak in synthetic organic chemicals. The U.S. government collaborated with business leaders in establishing a domestic industry to fill the gap. Steen hopes her study of the industry from 1910 to 1933 will supply historical perspective on government-industrial relations, a topic of considerable importance today.

Steen is a Phi Beta Kappa graduate in history and economics from Luther College, Iowa, and has taught U.S. history at the University of Delaware. She recorded historic structures for the Historic American Engineering project for three summers.

John Stock Wins Dexter Award

John T. Stock, Professor Emeritus of Chemistry at the University of Connecticut, won the Dexter Award for 1992. Educated at the University of London, Stock did postdoctoral research with Izaac M. Kolthoff at the University of Minnesota. For some years he ran the laboratory and semi-scale plant at Fuller's Ltd., a London foodstuffs manufacturer.

Stock has developed and published numerous improvements in chemical analysis and instrumentation and studied their historical development. His most recent book, coedited with Mary Virginia Orna, is the American Chemical Society's *Electrochemistry: Past and Present*. He holds a concurrent appointment as Honorary Research Fellow of London's Science Museum.

The Dexter Award, given annually by the American Chemical Society's Division of History of Chemistry, honors outstanding accomplishment in the history of chemistry. For instructions or to send nominations (due 1 January 1993) write Derek A. Davenport, Chemistry Department, Purdue University, Lafayette, IN 47907.

Ralph Hirschmann of Merck and Penn Honored at Seventy

Four weeks after our Woodward commemorations, our neighbor, the University of Pennsylvania chemistry department, celebrated the seventieth birthday of Ralph Hirschmann with its own galaxy of symposium speakers. A native of Germany educated at Oberlin and the University of Wisconsin, Ralph Hirschmann rose to be senior vice president of Merck & Co.; on retirement he became a research professor at Penn. He is well known for his steroid and protein researches.

At the celebration a member of our Woodward Advisory Board, Derek H. R. Barton of Texas A&M University, reviewed his own work on reactions that mimic nature in their speed, specificity, and mildness of conditions—by using not enzyme analogues but the much simpler free-radical reagents. Stuart L. Schreiber of Harvard, who is depicted in the Beckman Center's Woodward brochure as one of RBW's young sedan-chair carriers, also spoke. Particularly memorable among the slides illustrating the various talks were those of Cornell's Jerry Meinwald, which showed the gala displays of insects responding to pheromone signals, and the recurring slide honoring Hirschmann and using the letters of his name:

Happy
Innovative
Research
Scientist
Creates
Harmonious
Memories
And
Never
Neuroses

NEWS from the Donald F. & Mildred Topp Othmer Library of Chemical History

On File: Oral Histories

From Page Boy to President: William Wishnick and the Witco Chemical Company

When William Wishnick was twelve years old, he was hired to appear as a page boy like the one often featured in commercials for Phillip Morris cigarettes. But instead of selling cigarettes, he was to work at the Chemical Exposition of New York, in the Grand Central Palace exhibition hall. His employer was displaying little jars of chemicals for the paint industry. As he recounted in an oral history interview, he always knew he would work for this employer. In fact, his high school vacations were often spent pushing barrels around in the company warehouse, and summer vacations from college were spent in the laboratory or plant. And less than thirty years after his debut as page boy, he was chairman of the board.

When Wishnick speaks about his life with the company, his voice is filled with pride as he extols its founder, his father, Robert I. Wishnick. Describing the company's history in a 1976 address to the Newcomen Society, Wishnick said, "It is difficult to imagine what the Witco Chemical Corporation would be without the guiding strength of Robert Wishnick. . . . All of us have in one way or another been affected by him in our personal and business life."

The company began in 1920, when Robert Wishnick and David and Julius Tumpeer formed a small chemical jobbing concern, reselling in small lots the chemicals they bought in bulk. Specializing in chemicals to make paints, printing inks, rubber goods, and other products, they called their new enterprise the Wishnick-Tumpeer Chemical Company. Wishnick is quick to point out that "nepotism never played much of a part" at Witco. After the early years, no other Wishnick relatives worked for the company. "My father personally asked his son-in-law to leave when he wasn't working out too well, and the same

Continued on page 14

The Othmer Library site, from the northeast.

Building the Othmer Library

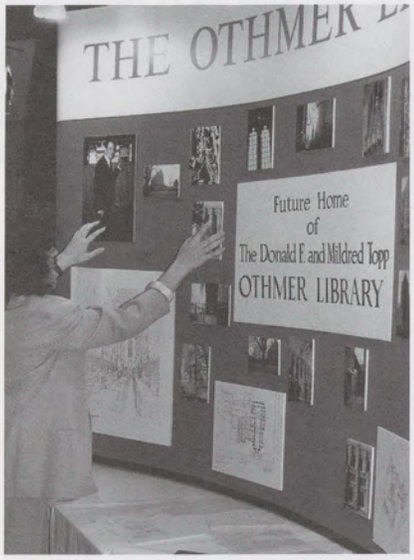
THE PERMANENT HOME of the Donald F. and Mildred Topp Othmer Library of Chemical History is coming closer to reality. Thanks to the far-sighted generosity of Donald F. Othmer of Brooklyn, New York, and the vision of the University of Pennsylvania, the Othmer Library will occupy the magnificent neo-Gothic chapel of the former Philadelphia Divinity School at 42nd and Spruce Streets. As the centerpiece of the new site for the Chemical Heritage Foundation, the Othmer Library of Chemical History provides the library and archival resources that underpin the public outreach component of the Foundation and the academic programs of the Beckman Center for the History of Chemistry.

A selection committee made up of representatives of the Chemical Heritage Foundation and the University of Pennsylvania's Department of Facilities Planning has completed its review of architectural proposals, and has appointed the prize-winning architect Richard Conway Meyer to prepare the designs and oversee the phased renovation of the Divinity School Site. Meyer is working closely with a building committee chaired by Arnold Thackray. The first task is to develop a master plan for the Divinity School site—one that will allow the Othmer Library to grow as its collections and influence increase and as the work of the Chemical Heritage Foundation expands.

The Othmer Challenge Committee, headed by John C. Haas, is delighted with this announcement and with progress in raising funds for this project. The committee is particularly encouraged by its ability to secure the immediate cash necessary for minimal renovations and an early move to the site.

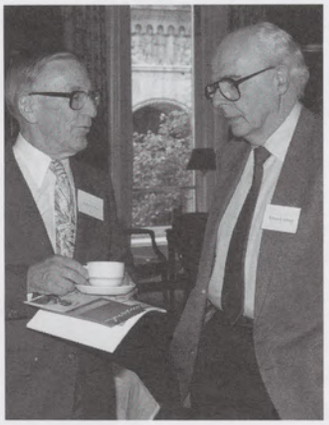
The Othmer Library serves as the preeminent national repository for books, photographs, diaries, manuscripts, videodiscs, and audiotapes that

Continued on page 12



Left: CHF's Lisa Kazanjian makes preparations for the luncheon . . .

Chemical communicators Theodor Benfey (CHF) and Patrick McCurdy (ACS) conferred . . .



. . . as did Herbert "Ted" Doan (Dow) and William Helfand (Merck).

. . . in honor of Don Othmer.

The 1992 Othmer Celebration

Donald Othmer is still as upbeat about the twentieth century as he was at the first Othmer luncheon in 1990. This century (he said on that occasion), with all its ups and downs and busts and booms, is still the most wonderful century to be living in and unlikely to be equaled in the future. In his greetings to the assembled company of well-wishers at the third Othmer luncheon, held 10 May in New York, Othmer recalled those sentiments and repeated his hope and expectation that he would see the century to its end.

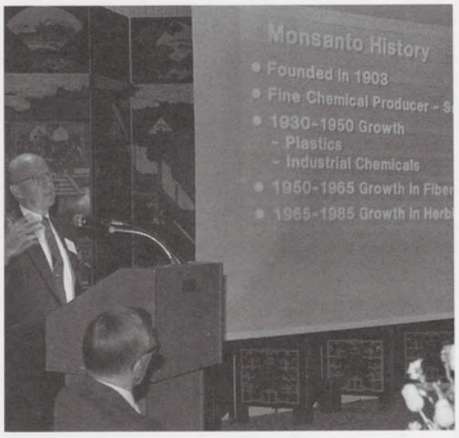
The third Othmer luncheon was held at the Princeton Club, particularly suitable since it now houses the offices of The Chemists' Club, of which Donald Othmer has for long been a leading member. The elegant building was recently renovated by Robert Venturi, and a mural of Princeton's green surroundings along one wall of the dining room accorded with the joyful mood of the event.

Vincent A. Calarco, chairman of the Crompton and Knowles Corporation, introduced the main speaker, Alan Heininger. First, however, he expressed his thanks to Don Othmer, his former teacher at Polytechnic University. Don Othmer, through his extensive involvement with industry, provided in his lectures that sense of reality that students seek so desperately but so often in vain.

Alan Heininger, immediate past president of the American Chemical Society and former vice-president for resource planning at Monsanto, explored the topic "Corporate Strategy and Chemical Industry: Yesterday, Today and Tomorrow." In a superb slide presentation he looked at the American chemical industry during the years in which it was reaching technological maturity, a setting very different from the era of innovation, the industry's beginnings. He showed the remarkable success of the industry in maintaining a positive trade balance through the years since 1976, during which the country posted large deficits in its overall balance of trade. Heininger described Monsanto's strategy for remaining competitive around 1979: it increased its commitment to research and development from 8 percent to 17 percent of profits with a major emphasis on innovation in the life sciences. The strategy seems to have paid off.

The Chemical Heritage Foundation provided a booth that showed scenes and events from Don and Mildred Othmer's life and work, as well as architects' drawings of and specifications for the permanent home of the Othmer Library of Chemical History.

Other participants included (from the right) John Haas (Rohm and Haas), sitting next to Donald and Mildred Othmer; Charles Price (CHF); the speaker, Alan Heininger (ACS); Abraham Zoss (Société president); Paul Kohnstamm (General Color); and Vincent Calarco (Crompton and Knowles).



Alan Heininger used his experience at Monsanto to illustrate his talk.

ARCHIVES

Witkop Papers and Percy Julian

Percy Julian, seen enlarged in the insert and with fellow students in a chemistry class at DePauw, about 1920. Courtesy Donald J. Cook and DePauw University Archives and Special Collections.

Bernhard Witkop, Institute Scholar at the National Institutes of Health and former chief of the Laboratory of Chemistry of the NIH National Institute of Arthritis and Metabolic Diseases, has given CHF his correspondence, which extended from 1947 to 1973, with the noted biochemist and industrial chemist Percy Lavon Julian (1899–1975). Regarding their friendship, Witkop once wrote that "in the treasury of letters received from Percy Julian over a time span of thirty years, the woof of chemistry and the warp of the human condition, private and collective, interweave to a fabric that shows Percy Julian the scientist to be as great as, and inseparable from, Percy Julian the humanist." Witkop delivered the Percy L. Julian Memorial Lecture, entitled "The Humanist as a Chemist," at NIH and at DePauw University in 1978.

Witkop, a student of Heinrich Wieland in Munich who later worked with Robert B. Woodward at Harvard, nominated Julian, the first black scientist to be so honored, to the National Academy of Sciences. He also wrote the Academy's memoir on Julian, which elicited additional correspondence.

Witkop also donated two photographs, one of Woodward visiting with Witkop and one of Paul Ehrlich surrounded by his large family.

The Enzyme Club: The Philip Siekevitz Papers

Philip Siekevitz, Professor Emeritus at Rockefeller University, has deposited in our archives a major collection of papers of the Enzyme Club of New York, of which he was the prime mover for more than thirty years. The club met monthly for fifty years, first at Columbia and after 1958 at Rockefeller, until it was disbanded in 1992. Seminar series in numerous subdisciplines do now what the club did earlier.

In 1942, when the club began meeting, "you could fit all the biochemists in New York City into one small room," according to Siekevitz. Since then most of the leaders in protein and nucleic acid chemistry, including more than twenty Nobel laureates, have addressed the club. On its dissolution the club donated $2,000, the amount left in its account, to Rockefeller University's High School Outreach Program to help young people who "may not even have thought of going into science."

Included among the papers donated are Siekevitz's published history of the club through 1982 and his other historical writings, as well as founding correspondence, early and later membership lists, a complete list of speakers and topics since the club's beginning, financial records (including correspondence with Merck, Ciba-Geigy, Schering, Lederle Laboratories, Hoffmann–La Roche, Sandoz, and Squibb, all of whom supported the club's activities), as well as papers on the twenty-fifth and fiftieth anniversary celebrations.

John Ferry Adds to Flory Papers

John D. Ferry of the Chemistry Department of the University of Wisconsin has added his correspondence with Paul J. Flory and related papers to the Flory archive at CHF. The letters, written from 1950 to 1984, during which time Flory moved from the Mellon Institute to Cornell and then to Stanford, cover technical topics and scientists working in the polymer field as well as nominations for several awards. Ferry nominated Flory for the Nobel Prize in 1950, an award he did not receive until 1974. In a letter from 1957 Flory comments on the inscrutability of the selection process for the Fulbright Award: "I was turned down, but a few months later one of my former students who flunked out for a Ph.D. got one." Included is Ferry's informative introduction of Flory as the 1973 Willard Gibbs medalist of the ACS Chicago section.

Bartlett Course Notes Donated

On reading of CHF's acquisition of Paul D. Bartlett's papers, Ralph B. Thompson of Hinsdale, Illinois, contributed his notes of Bartlett's Chemistry 17a lectures at Harvard for 1938, one of the early courses in physical organic chemistry, complete with lists of references. The first part of the notebook is a partial translation by Thompson of Paul Karrer's *Lehrbuch der organischen Chemie*, carried out to improve his German.

News of Other Collections

At the suggestion of CHF staff **R. Bruce King,** Regents' Professor of Chemistry at the University of Georgia, placed thirty-five boxes of his papers in the University of Georgia archives. Representing the first phase of transmittal, these boxes relate to editorial correspondence for the *Journal of Organometallic Chemistry*, correspondence with granting agencies, and various aspects of the University of Georgia.

William D. Williams of Harding University's chemistry department and

Continued on page 12

Von dem Golt.
Wie man das Silber widerumb
auß dem Scheidwasser bringen vnd fellen sol.
Ann man das Silber durchs Scheidwasser vom Goldt sol-
uirt / vnnd das Scheidwasser solches in sich gezogen hat / vnd
man wil dasselbig widerumb auß dem Scheidwasser bringen /

Equipment for liberating silver from a nitric acid solution, from Lazarus Ercker, Beschreibung allerfürnemisten Mineralischen Ertzt und Bergwercksarten. *From the Othmer Library.*

OTHER COLLECTIONS—*from page 11*

Wyndham D. Miles, science historian for more than forty years for several U.S. government agencies, have created the Williams-Miles Rare Chemistry Collection at Harding University. Miles was the 1971 Dexter Award winner and is currently completing the second volume of his *American Chemists and Chemical Engineers.* In the collection of over fifteen hundred volumes published between 1600 and 1900 are six books by Robert Boyle, sixteen by Humphry Davy, four by Michael Faraday, twelve by William Henry, forty by Justus Liebig, and twenty-five by Joseph Priestley. Over two-thirds of all chemistry titles published in the United States before 1880 are included, among them twenty-five by Robert Hare and twenty-eight each by John Comstock and Jane Marcet.

A list of books in the collection is available for $3 from William D. Williams, Harding University, Box 602, Searcy, AR 72143.

Books Keep on Coming

Ercker Joins Agricola. Through the generosity of the historian of metallurgy Cyril Stanley Smith, the Othmer Library now owns a beautiful copy of the 1598 edition of Lazarus Ercker's *Beschreibung allerfürnemisten Mineralischen Ertzt und Bergwercksarten.* It joins thee copies of Agricola's *De Re Metallica* (the 1621 and 1657 editions and the translation by Herbert C. and Lou Henry Hoover, 1912), so that the library now has two of the three comprehensive mining and metallurgical treatises of the sixteenth century. The third, Vannoccio Biringuccio's *De la pirotechnia,* is not in our collection. Ercker, who died in 1593, was inspector general of mines in the Holy Roman Empire. His book emphasized assay methods more than Agricola's. According to Aaron Ihde, no metallurgical book in the ensuing century went much beyond these classics.

History in Stamps and a Fritz Welsch Festschrift. From Horst Remane of the Pädagogische Hochschule Halle came his and Hans Wussing's *Wissenschaftsgeschichte en Miniature* (Berlin: VEB Deutscher Verlag der Wissenschaften, 1989), a philatelic history of science with major sections on chemical industry and the chemical sciences. He also sent an issue of *Manuskripte zur Chemiegeschichte,* published by the Halle institute, honoring Fritz Welsch. The issue includes papers by Remane (on Julius A. Stöckhardt's popularization of chemical experiments), G. P. Muzzo, L. Beyer, and Remane (on Wilhelm Ostwald), and Wolfgang Göbel (on Welsch and the history of chemical industry). On Welsch's biography of A. W. Hofmann see p. 23.

Found in the Othmer Library III

Browsing through any large collection of books always produces at least one curious title that intrigues and gives pause. We all know that chemistry has diversified into myriads of tiny specialisms. But who among us who does not work in an insurance office would expect to find a book entitled *Harris's Technological Dictionary of Insurance Chemistry*?

This interesting tome was published in Liverpool, England, in 1890 by the Phoenix Fire Insurance Company; it has 407 pages, with alternate pages left blank for the owner to write notes on. The author, William A. Harris, who was the secretary of the Phoenix Insurance Company, had already compiled *A Technical Dictionary of Fire Insurance* in 1886. His *Insurance Chemistry* was addressed to insurance managers, underwriters, and insurance agents; surveyors and government officials; captains, shippers, stevedores, and harbor masters; railway, dock, and traffic managers; merchants and warehouse keepers—to explain the various risks from "spontaneous combustion, oxidation, chemical affinity, fermentation, friction, expansion of gases, inflammability of vapors, dust-explosions, steam-heating and drying, oils, fibers, coal, cotton, and mixed cargoes, etc." Clearly the book is the equivalent of today's list of hazardous chemicals.

The Othmer Library copy was originally presented by Harris to the Franklin Institute, of which he was a member. The entries contain quite a few references to American chemical fires and explosions—it seems, for example, that Philadelphian gentlemen in the 1880s lit their cigars with pieces of sodium!

WILLIAM H. BROCK
Edelstein International Fellow 1991–92
University of Leicester

OTHMER LIBRARY—*continued from page 9*

tell the story of chemical achievement and of the men and women responsible. The core of the library consists of over 40,000 volumes donated by The Chemists' Club. These volumes span the era from the Civil War through World War II and form an unrivaled resource for the history of American chemical business and technology. Since March 1991 almost 200 individuals from throughout the United States and abroad have donated about 1,000 additional titles, ranging from Lazarus Ercker's *Bergwercksarten* (1598) and Robert Boyle's *Usefulness of Experimental Natural Philosophy* (1664) to Humphry Davy's *Elements of Agricultural Chemistry* (1813), George E. Davis's *Handbook of Chemical Engineering* (1904), and the classic Walker-Lewis-McAdams text *Principles of Chemical Engineering* (1923). In addition CHF has received the research archives of such noted individuals as William J. Bailey, Paul Flory, Daniel Fox (inventor of Lexan), and C. S. "Speed" Marvel.

On File: Oral Histories

J. Franklin Hyde

Organic Chemist in a Glass Factory, Part II

Part I, which appeared in issue 9:2 (Summer 1992), told of Franklin Hyde's decision to become the first organic chemist at Corning—a leap into the unknown—rather than join the well-established research organization at Du Pont.

While completing his work at Harvard, Franklin Hyde prepared for his new position, designing a new organic lab at Corning and stocking it with books and supplies, including the fundamental chemical silicon tetrachloride.

When Hyde arrived in August 1930, he found that the commercially available silicon tetrachloride contained "some titanium and a few other impurities in small amounts," and needed to be purified before it could be used to make organosilicon compounds. He noticed that during the distillation of silicon tetrachloride an iridescent film formed if there was moisture on the glass. At just this time another Corning laboratory group was developing high-voltage insulators of Pyrex glass and needed "thin semiconducting coatings to spread out the voltage drop and reduce the possibility of arcing." "Too timid to ask them exactly what they were doing," Hyde did observe their attempts at trying to get thin iridescent films on glass and asked if the film he formed in the silicon tetrachloride distillation might be of any use. Although his idea was immediately rejected, Hyde kept thinking, "Why didn't they at least try it?" Finally he decided, "If they're not going to try it, I will." Blowing some silicon tetrachloride on a heated glass test sample gave an iridescent film that proved to be conducting. Just three months after his arrival, Hyde filed his first Corning patent application. He refuses to call this an example of serendipity. "I don't like that word. You have to have some insight to recognize something that's useful." Another expression that Hyde disdains is "anomalous behavior." He explains that "molecules will always do what they are supposed to do. It's our conceptions that are anomalous."

After carefully reviewing all of Frederick Stanley Kipping's papers, Hyde began his synthetic work by selecting the phenyl derivatives of silicon tetrachloride because they were crystalline compounds that were easy to work with and could be characterized by melting point and molecular weight. The products were "a long way from glass," but "these experiments were part of trying to learn something about what I could get out of the organosilicon compounds." Initially he did not have a specific goal in mind. However, hydrolysis of one crude reaction mixture gave a "resinous, low-melting, low-molecular-weight material" which became quite fluid when melted. Hyde heated this liquid in a thick-walled Pyrex tube, and even when the glass started sagging, "a nice clear liquid" remained inside. This striking thermal stability signaled the completion of the first step towards what would eventually become a major chemical industry.

While continuing to prepare other derivatives, Hyde also studied the urea-formaldehyde resins, phenol-formaldehyde polymers, and polyvinylacetate (PVAc). In 1932 Corning had been commissioned to install a large window over the entrance to the RCA Building in Rockefeller Center, depicting a relief map and a man with calipers measuring off the universe. As Hyde recounts the problem, the window, fifteen by forty feet overall, was actually a series of smaller cast panels. "Almost every one of them was different. If you cast glass panels of a size around eighteen by twenty-six inches and can get it to the same dimensions within an eighth of an inch, you're doing pretty well. They didn't know how they were going to put them together. PVAc has the same refractive index as Pyrex glass to within the third decimal place. I did some loading tests that showed that it would hold the weight without too much flow. Union Carbide made big slabs of PVAc and cut them into slices. We put these against the glass, and brought hot platens in to melt them onto the glass. That brought the glass out to accurate dimensions. Still something had to be put in between them while in place. But what? I came up with a very viscous, sticky solution of PVAc dissolved in its monomer." After getting permission from the glaziers' union, Hyde spent a month in New York, "squeezing out this stuff that was going in between" the panels. "This is the way that we put that window together. This 'glue' was easy to work and fitted perfectly between the other slabs. Then the monomer would slowly polymerize and make a solid seal." Sixty years later the window is still there, and Hyde acknowledges that he looks at it whenever he is in New York.

Other immediate Corning interests got Hyde "off the track of organosilicon compounds." When "there was talk of

Continued on next page

Polychromatic stone and glass decoration at the main entrance of the RCA building in Rockefeller Center, New York, designed by Lee Lawrie and installed in 1933. Wisdom personified uses calipers to gauge the cycles of light and sound. Hyde solved the problem of mounting the individual glass blocks. Photo courtesy of Rockefeller Center.
© The Rockefeller Group, Inc.

HYDE—*continued from page 13*

building a large telescope for Mt. Palomar," he "knew it would be difficult trying to fuse powdered quartz" because of its high melting point. In a patent filed in 1934, Hyde outlined his technique for "vaporizing a hydrolyzable compound of silicon into a high-temperature flame of combustible gas combined with oxygen, impinging the flame on a refractory core to deposit a layer of silica in the shape of the desired article, and vitrifying the layer to a transparent article." The method has become an important industrial process for making components in radar relay systems, telescopes, and fibers for fiber-optic communication.

When Sullivan told Hyde confidentially that the fiber products divisions of Corning and Owens-Illinois would be merged to form the Owens-Corning Fiberglass Corporation and asked him what he would like to do, Hyde replied, "There are two important things, as far as I'm concerned. One of them is the chemistry of glass surfaces, and the other is this organosilicon chemistry, which I think has quite a lot to offer." He proceeded to "rescue some of my equipment that I liked, such as a nice analytical balance" from the fiber-products laboratory and took it to the main laboratory "before these Owens-Illinois guys descended on the place. They put a tag on everything. This gave me a chance to get back full-time on organosilicon chemistry."

In 1938 he "started making phenylethyl siloxanes and looking for ways to polymerize them. Making the Grignard reagent, separating the solids, and then distillation wasn't easy. We were able to cause polymerization by acid treatment." Hyde confesses that he "wasn't sure just what was going on when we did it, but at least I could get a polymeric resinous material out of the hydrolysis." When the Macbeth Evans Glass Company of Charleroi, Pennsylvania, was acquired by Corning, which had been supporting research at the Mellon Institute, Hyde was joined in his pioneering work at the Mellon by Rob Roy McGregor and Earl Warrick of Macbeth Evans. Warrick has ably described the events that subsequently led to the formation of the Dow Corning Corporation in 1942, in his *Forty Years of Firsts* (McGraw-Hill, 1990).

Hyde remained with Corning until 1951, when he moved to Midland, Michigan. He spent the next twenty-four years with Dow Corning as a research scientist, which he preferred to pursuing a management position. In 1955 Eugene Sullivan described Hyde as "the man who was the first in the world to produce a useful silicone and on whose work an industry was founded."

JAMES J. BOHNING

WISHNICK—*continued from page 9*

with my brother. They never had any hard feelings. They just weren't happy with the company."

Wishnick notes that "I made it on my own because I was good," but his "rise to the top wasn't exactly jet-propelled." After serving in World War II with an engineering battalion building airstrips in the Pacific, he completed a business degree at the University of Texas. He began his Witco career in 1949 by staffing the sales order desk in Chicago. His advice to young people includes the admonition, "Don't ever work for your father directly in the beginning, because you're pretty dumb and your father is pretty smart."

In 1950 he left Chicago for the asphalt division in Perth Amboy, where he led the rebuilding of a plant that had been shut down by an explosion, then moved to chemical sales in New York—always working for somebody other than his father. Within a few more years, during a management reorganization, Wishnick became the executive vice president of the company, his father became chairman of the board, and Max Minnig, a long-time employee, became president.

Part of Wishnick's job was to get rid of the jobbing aspects of the company and add more manufacturing. The company had three very simple old asphalt plants. "We oxidized asphalt and spilled it on the ground and that was that." Maintaining a fine balance to keep the commissioned salespeople motivated, he slowly sold the jobbing back to the principals, offering to sell them "the names of the accounts, volumes, prices, and bids." In 1958 his father asked, "Son, what do you think we ought to do? We can stay as we are, we can go public, or we can sell the business." Wishnick knew his father well. As he recalls, "If I had said, 'Sell the business,' he would have fired me on the spot. We knew we couldn't stay the same. So we went public, and that is when we decided we were going to use being public as a way to grow. From 1958 on we bought mostly good companies with good people, getting rid of the jobbing as we added manufacturing."

"When I did acquisitions there were not many around," Wishnick concedes. "People just did not sell; it was almost

Trucks from three stages of the history of Witco. Left to right: 1930s, 1940s, 1980s. From the Chemical Heritage Foundation photographic collection.

Our Hundredth Oral History

Chemically historic Havemeyer Hall on the campus of Columbia University was recently the site of the one-hundredth interview in the Chemical Heritage Foundation's oral history program. James J. Bohning, Assistant Director, and Leonard Fine of Columbia's chemistry department spent over six hours with Professor Gilbert Stork, recording his recollections of an illustrious career in synthetic organic chemistry. In addition to his childhood in France, his education at the universities of Florida and Wisconsin, and his academic career at Harvard and Columbia, Stork also reviewed his diverse scientific accomplishments. He is widely recognized as a creative, boldly imaginative, and penetratingly thoughtful contributor to organic chemistry—one with few peers.

Other recent interviews include sessions with Norman Hackerman (Welch Foundation), Charles Hurd and Fred Basolo (Northwestern), Madeleine Jouillé (University of Pennsylvania), William Wishnick (Witco Corporation), Elkan Blout (Harvard Medical School), and Rudolph Marcus (Caltech). William Gauvin (McGill University and William H. Gauvin Technologies), considered one of the leading chemical engineers in Canada, was interviewed in Montreal. A bound copy of the edited transcript was presented to him at the December meeting of the Montreal Section of the Canadian Society for Chemical Engineering by Edwin J. Bassler, AIChE Vice President for 1992.

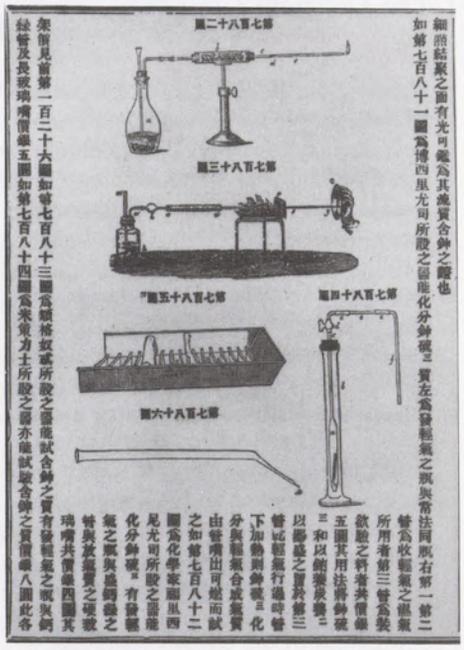
an admission of poor management. When the raiders got more accustomed to it, then everybody sort of liked selling out. The 1980s were so easy. The 1980s were mind-boggling." Noting that he "wouldn't want to marry a girl that didn't want to marry me," Wishnick boasts that he "never bought a company that didn't want to be bought."

Robert Wishnick had in fact made one unsuccessful attempt at acquisition during World War II. While aboard the Twentieth Century train to New York, he wrote a letter to his lawyer with a list of all the chemical companies then secured by the Alien Property Custodian, with an eye to acquiring them. Among the seven companies he was particularly interested in were the Schering Corporation, General Aniline and Film, and Rohm and Haas! Wishnick says his father's thinking was, "If the government owned the chemical companies, then let's go buy a chemical company from the government."

In reflecting on his long career with Witco, from which he retired in 1991, Wishnick expresses his convictions in plain words. "I find business very simplistic if you follow certain lines. You can't go to the left one day, and go straight the next day; there's a certain way you've got to run your personal life and your business. You can't shade it this way one day and then decide you're going to do it differently. You've got to earn a reputation. It takes a lot of years to earn a reputation, and then overnight it can go. Once it's gone, it's gone forever."

JAMES J. BOHNING

PUBLICATIONS



Western chemical equipment illustrated in the science magazine Ko-chih hui-pien, *1881.*

Chemistry in Modern China

James Reardon-Anderson. *The Study of Change: Chemistry in China, 1840–1949.* New York: Cambridge University Press, 1991. 444 pages. $59.50.

Whereas our word *chemistry* derives from the Chinese *kim* for gold, or at least from the Arabic *al-chymia*, the word for modern chemistry in Chinese (*hua-hsueh*) and in Japanese (*kagaku*) is written with two characters meaning "the study of change," a phrase proposed by Western missionaries. The new chemistry was clearly different from the traditional practices and thought forms represented by Chinese characters for the crafts of ennobling metal and producing elixirs.

James Reardon-Anderson has written the first full-length account of chemistry in modern China, from its introduction by missionaries in the middle of the last century through the toppling of the Manchu dynasty and the successive republican, Kuomintang, and Communist governments. Based on extensive Chinese, Japanese, and Western sources, the book focuses not only on chemistry as it unfolded in China, but also on its impact on Chinese language, industry, education, culture, and politics.

Continued on next page

The Edelstein Collection

Moshe Ron. *Bibliotheca Tinctoria: Annotated Catalog of the Sidney M. Edelstein Collection in the History of Bleaching, Dyeing, Finishing, and Spot Removing.* Jerusalem: Jewish National and University Library, 1991. $110.

Sidney M. Edelstein, chairman of the Dexter Chemical Corporation, chemist, industrial leader, benefactor, and scholar, has been collecting the historical sources of the dye industry for half a century. His collection, now housed in the Hebrew University, Jerusalem, reflects his expertise and discrimination. It is a remarkable achievement and all the more so for a busy entrepreneur.

This meticulously researched and beautifully crafted volume is a worthy companion to the superb collection it describes. Far more than a catalog, it can also serve as a scholar's entry into the history of dyeing and textile finishing. The 1,220 books, manuscripts, documents, and periodicals in numerous languages are listed with full bibliographic detail, followed by helpful translations where needed, notes, and references to other historical collections and to published commentaries.

The first printed book exclusively devoted to professional dyeing, Gioanventura Rosetti's *Plictho de larte de tentori,* is present in all six editions from 1548 to 1911 as well as in its celebrated translation by Edelstein himself and Hector C. Borghetty. Included also is the first edition of the first book on dyeing published in America, *The Country Dyer's Assistant,* by Asa Ellis, Jun. (1797), and forty-one items by the organic chemist and director of the Gobelins tapestry works Michel Eugène Chevreul. Helpful name, title, and subject indexes are included.

Sidney Edelstein's foreword describes the chance beginnings and further development of his collection, and Melvin Kranzberg's introduction points to the cultural significance of the dyeing industry and of the collection that preserves its history.

The author of the work, Moshe Ron, who was born in Hungary and managed to survive under the Nazi occupation, is the twentieth-century equivalent of a Renaissance man—photographer, journalist, and broadcaster, with degrees and diplomas in history, philosophy of science, and library science. Head of the Edelstein Library since 1976, he has given historians of science and technology a major new scholarly resource.

Sidney Edelstein's bookplate

PUBLICATIONS—*continued from page 15*

To do justice to the topic, Reardon-Anderson, not trained in science, went back to school. Thanks to Ronald Breslow and others in the Columbia chemistry department, he could proclaim, "I want to begin with a tip for my fellow sinologists: Science is not that hard!"

The author, on leave from Georgetown University, is director of the Committee on Scholarly Communication with the People's Republic of China.

Canadian, Japanese, and Anglo–U.S. Profiles

The latest chemical autobiographies to appear in the Profiles, Pathways, and Dreams series (Jeffrey I. Seeman, editor; Washington, D.C.: American Chemical Society) are Michael J. S. Dewar, *A Semiempirical Life;* Raymond U. Lemieux, *Explorations with Sugars: How Sweet It Was;* Koji Nakanishi, *A Wandering Natural Products Chemist;* and Tetsuo Nozoe, *Seventy Years in Organic Chemistry.*

Books to Note

Clark K. Colton, editor. *Perspectives in Chemical Engineering: Research and Education.* (Advances in Chemical Engineering, 16). Boston: Academic Press, Inc., 1991. 606 pp. $99.95.

The cover announces "A Century of Chemical Engineering, 1888–1988," and the introductory chapter by Clark K. Colton explains that chemical engineering can be considered as having originated in September 1888 at MIT, when eleven sophomores enrolled in Lewis Mills Norton's course of that title. The subject also had a prehistory, which Colton outlines by surveying the heavy chemicals industry, coal tar dyes, and electrochemistry. He discusses and shows pictures of the early giants of the field—William H. Walker, Warren K. Lewis, and Arthur D. Little—and then considers the succeeding frontiers—petroleum refining and high-pressure and catalytic processing, followed in the second half-century by synthetic detergents, plastics, and synthetic rubber.

The historical perspective and overview section continues with Ralph Landau's analysis of early academic-industrial interactions in chemical engineering at MIT, and concludes with James Wei's look into the future of the discipline. The book then examines various specialties, each section ending with comments by participants who attended the centennial symposium that launched the book.

Tomlinson Fort; Karol J. Mysels, editors. *Eighteen Years of Colloid and Surface Chemistry: The Kendall Award Addresses, 1973–1990.* Washington, D.C.: American Chemical Society, 1991. $59.95. 398 pp.

This is the second volume of award addresses by the recipients of the Kendall Award, established in 1952 by the Kendall Company "to recognize and encourage outstanding scientific contributions to colloid or surface chemistry in the United States or Canada." Since a complete list of each individual's publications is included, the volume presents an unusual access to the technical litera-

ture. More important, it is an excellent review of almost two decades of surface and colloid chemistry, and it reflects the change and development that is the trademark of any healthy branch of science. The first volume covered topics such as thin films, rheology, and aerosols (K. J. Mysels et al., eds., *Twenty Years of Colloid Chemistry*, Washington, D.C.: American Chemical Society, 1973); this one discusses surface spectroscopy, electrochemistry, and computer simulations. Unfortunately, while the volume describes the scientific details more than adequately, there is a lack of autobiographical information, and no sense of the personalities and camaraderie that permeates the award ceremony. The result is a volume that will appeal mostly to other surface and colloid scientists who speak the same technical jargon.—**James J. Bohning**

J. G. Fyffe; R. G. W. Anderson. *Joseph Black: A Bibliography.* London: Science Museum, 1992. 125 pages. £9.95.

The Scottish chemist Joseph Black (1728–1799) was born in Bordeaux, France, schooled in Belfast, and trained in medicine in Glasgow and Edinburgh. He made extensive studies on alkalis and on the nature of heat. He distinguished fixed air (CO_2) from atmospheric air, and thereby carbon dioxide became the first gas to be chemically characterized. Robert Anderson, winner of the 1986 Dexter Award, and his colleague at the Science Museum completed this exemplary annotated bibliography just as Anderson was called to become Director of the British Museum. The bibliography covers works by Black and his contemporaries, works on Black, and works on the controversy between Black and J. F. Meyer regarding the nature of causticity. A detailed family tree and index complete the book.

Hélène Metzger. *Chemistry.* (Women in the Sciences series, 1.) Translated and annotated by **Colette V. Michael.** West Cornwall, Conn.: Locust Hill Press, 1991. 151 pages. $25.

The celebrated and influential historian Hélène Metzger (see *Beckman Center News* 7:2, Summer 1990, p. 12) wrote a history of chemistry in 1930, *La Chimie*, which was published by E. de Boccard as part of *La civilization européenne moderne*, Volume 13 of *Histoire du monde*. Metzger, a philosopher as well as historian, taught historians of science to put themselves in the context of the scientists they describe instead of arrogantly judging the past in the light of the present. The book surveys in some detail chemical developments from the time of Stahl through the chemical revolution and rather more briefly the nineteenth century to the periodic table and the structural theory of organic chemistry.

The translator has added footnotes, expanded the author's biographical notices, enlarged the bibliography, and supplied an index.

Hugh W. Salzberg. *From Caveman to Chemist: Circumstances and Achievements.* Washington, D.C.: American Chemical Society, 1991. 294 pages. $24.95 (cloth), $14.95 (paper).

Hugh Salzberg is a physical chemist who has worked in industry and at the Naval Research Laboratory; for over thirty years he has taught chemistry at the City University of New York. He has also taught history of chemistry to interest undergraduates and answer his own questions. The book is a readable narrative of chemical knowledge and exploration from ancient times and Greek, Roman, Islamic, and Chinese civilizations through the chemical revolution to the end of the nineteenth century. Salzberg places chemical developments in their social and political settings and seeks to bring to life the chemists whose work he relates.

The Chemical Sciences Book for the Coffee Table

Otto Krätz. *Faszination Chemie: A 7,000-Year Cultural History of Materials and Processes.* Munich: Verlag Georg D. W. Callwey, 1990. 332 pages. DM 148.

At last what many of us have been looking for has appeared—a lavishly illustrated presentation of "7,000 years of the cultural history of materials and processes," *Faszination Chemie*. After 124 pages of text with small illustrations comes a picture section of almost 200 pages. The author, Otto Krätz, was from 1971 to 1987 head of the chemistry section of the Deutsches Museum, Munich, where he is now in charge of outreach and public information. He also teaches history of chemistry at the universities of Munich and Stuttgart.

A note on the back cover presents the book's philosophy:

> Without chemistry there would be no industry, no modern medicine, no adequate food production. Thus chemistry is life, but it is also hazards, materials, and processes, which on the one hand are useful, but can also do harm. Taking this contemporary reality as a starting point, the author presents an all-encompassing overview of the history of chemistry from its beginnings in the ancient East and antiquity to the latest developments of the twentieth century.

The book's only drawback for most readers in North America is that its language is not English. The pictures, however, go far to compensate.

Pharmaceutical companies commonly used postcards between the world wars to promote their products. Here Nitroscleran is recommended for arteriosclerosis, angina, and hypertension. From Faszination Chemie. *Courtesy Otto Krätz.*

Other Recent Publications

Social, Institutional, Disciplinary, and Policy Studies

Günther Beer. "Die Gründung des Lehrstuhles und Instituts für Anorganische Chemie der Universität Göttingen 1903, der ersten Einrichtung dieser Art an einer preussischen Universität." *Mitteilungen der GDCh: Fachgruppe Geschichte der Chemie* No. 7 (1992), 34–49.

Bettina Löser. "Zur Gründungsgeschichte des Kaiser-Wilhelm-Institutes für Faserstoffchemie in Berlin-Dahlem." *NTM: Schriftenreihe für Geschichte der Naturwissenschaften, Technik und Medizin* 28 (1991), 73–93.

D. T. Zallen. "The Rockefeller Foundation and Spectroscopy Research: The Programs at Chicago and Utrecht." *Journal of the History of Biology* 25(1) (Spring 1992), 67–89.

Biography and Autobiography

Boris A. Arbuzov. "Our Path in Science." *Reviews on Heteroatom Chemistry* 5 (1991), 1–2. On Alexander E. and B. A. Arbuzov and phosphorus organic chemistry.

Theodor Benfey; Tony Travis. "Carl Schorlemmer: The Red Chemist." *Chemistry & Industry* (15 June 1992), 441–444.

Brian Bowers; Lenore Symons, eds. *Curiosity Perfectly Satisfied: Faraday's Travels in Europe, 1813–1815.* London: Peregrinus, 1992. U.S. distributor: IEEE, Piscataway, NJ.

Robert Boyle. *Selected Philosophical Papers of Robert Boyle,* ed. **M. A. Stewart.** Cambridge, Mass.: Hackett Publishing Company, 1991.

Geoffrey Cantor. *Michael Faraday, Sandemanian and Scientist.* New York: St. Martin's, 1991.

Carl Djerassi. *The Pill, Pygmy Chimps, and Degas' Horse.* New York: Basic Books, 1992.

Thomas A. Edison. *The Papers of Thomas A. Edison.* ed. **Robert A. Rosenberg et al.** Vol. 2: *From Workshop to Laboratory (June 1873–March 1876).* Baltimore: Johns Hopkins University Press, 1992.

Eugene Garfield. "The Restoration of Frantisek Sorm: Prolific Czech Scientist Obeyed His Conscience and Became a Nonperson." *Current Contents / Physical, Chemical & Earth Sciences* 32(15) (13 April 1992), 3–8. With reminiscences by Vladimir Prelog and Carl Djerassi.

Iwan Rhys Morus. "Different Experimental Lives: Michael Faraday and William Sturgeon." *History of Science* 30 (1992), 1–28.

John Meurig Thomas. *Michael Faraday and the Royal Institution: The Genius of Man and Place.* Bristol, U.K. / Philadelphia: Adam Hilger, 1991.

Tony Travis; Theodor Benfey. "August Wilhelm Hofmann: A Centennial Tribute." *Education in Chemistry* (May 1992), 69–72.

Petra Werner. *Ein Genie irrt seltener . . . Otto Heinrich Warburg: Ein Lesbensbild in Dokumenten.* Berlin: Akademie Verlag, 1991. Based in part on papers previously believed lost.

Bernhard Witkop. "Remembering Heinrich Wieland (1877–1957): Portrait of an Organic Chemist and Founder of Modern Biochemistry." *Medicinal Research Reviews* 12(3) (1992), 195–274. Also in German, as "Erinnerungen an Heinrich Wieland." *Liebigs Annalen der Chemie* (1992), i–xxxii. Includes complete Wieland bibliography.

The Lessons of IG Farben

The IG Farben Study Group has now produced three issues of its newsletter. They look ever more like copies of a journal about to make the transition from typescript to printed page. The first, dated 1989, contains articles by Tony Travis ("Artificial Alizarin: Rivals for Invention and Innovation") and Peter Reed ("The Early Years of Indigo Manufacture in Britain"), as well as book reviews, meeting notices, and a bibliography.

Newsletter 2 (1990), titled "IG Farben and the State," provides us with four symposium papers from the 18th International Congress for History of Science, held in Hamburg and Munich in 1989: Eric Elliott, "The IG Farbenindustrie: Is There Science Here for the Historian of Science?"; John Beer, "How Contemporary Scholars View the History of the Relations between the German Chemical Industry and the German Government in the Period 1871–1951"; Peter Morris, "IG Farben and the Third Reich: The Example of Synthetic Rubber"; and Raymond G. Stokes, "The Successors to IG Farben and the State, 1945–1961." These papers, together with Frank Bechtoldt's "Die IG Farben und die Politik Hitlers," appeared in German in *Mitteilungen, Gesellschaft Deutscher Chemiker, Fachgruppe Geschichte der Chemie* 5 (1991), 10–46.

Newsletter 3 (1991) focuses on East Germany: Herbert Bode, "Works on the History of Chemical Fibers at IG Farbenindustrie AG"; Rainer Karlsch, "Research on IG Farbenindustrie in Germany's East: At an End or Facing a New Beginning?"; and Peter Morris: "A Recent Fieldtrip to the Former German Democratic Republic."

For further information on the *IG Farben Study Group Newsletter* contact Raymond G. Stokes, Rensselaer Polytechnic Institute, Department of Science and Technology Studies, Troy, NY 12180.

Two recent books fill us in further on the history of IG Farben:

Jens Ulrich Heine. *Verstand & Schicksal: Die Männer der IG Farbenindustrie in 161 Kurzbiographien.* Weinheim, Germany /New York: VCH Publishers, 1990. $60.

Gottfried Plumpe. *Die IG Farbenindustrie AG: Wirtschaft, Technik und Politik 1904–1945.* Berlin: Duncker & Humblot,1990.

Chemistry in Finland, 1891–1991

For a centennial commemoration of Finland's chemical society, *Kemia-Kemi* (18 [(1991)], 999–1026) has issued, among others, articles by L. Niinistö and V. Komppa on Gustav Komppa and the Finnish chemical industry; by George B. Kauffman on Edvard Hjelt; and by A. Lundgren on Swedish chemistry at the turn of the century.

Chemical Industry; Chemical Engineering; Chemical Technology

Andrew Dequasie. *The Green Flame: Surviving Government Secrecy.* Washington, D.C.: American Chemical Society, 1991. A personal account of the government-sponsored boron fuels project and its ultimate collapse. Based in part on recently declassified documents.

Roger Firmenich. *From Chuit & Naef to Firmenich S.A.* Princeton, N.J.: Firmenich Inc., 1990. The history of the Swiss fragrance supplier.

Harold B. Friedman. "DDT (Dichlorodiphenyltrichloroethane): A Chemist's Tale." *Journal of Chemical Education* 69 (1992), 362–365.

Chikayoshi Kamatani. "The Chemical Industry in Meiji Japan: The Case of the Artificial Fertilizer Industry" (Part 2) (in Japanese with English summary). *Kagakushi* 19(1) (1992), 14–35.

Tony Travis. "Indigo: Putting the Blue in Blue Jeans." *Chemistry Review* 1(4) (March 1992), 2–6.

Analytical Chemistry; Environmental Chemistry; Instrumental Techniques

John R. Ferraro; Robert Jarnutowski; David C. Lankin. "Fifty Years of Commercial Instrumentation in Absorption Spectroscopy, Part I: Landmark Instruments in Infrared and Raman." *Spectroscopy* 7(2) (1992), 30–42.

C. J. Keattch; D. Dollimore. "Studies in the History and Development of Thermogravimetry: 1. Early Development; 2. Hannay's 'Time Method.' " *Journal of Thermal Analysis* 37 (1991), 2089–2102; 2103–2107.

Lauri Niinistö. "Analytical Instrumentation in the 18th Century." *Fresenius' Journal of Analytical Chemistry* 337 (1990), 213–217.

Ann Ratcliffe; Horacio A. Mottola. "A Chronicle of Instrumentation as Seen from the Table of Contents of Seven Editions of the Same Textbook." *Journal of Chemical Education* 68 (1991), 543–544.

Hamish Small. "Twenty Years of Ion Chromatography." *Journal of Chromatography* 546 (1991), 3–15.

Organic, Biomedical, and Pharmaceutical Chemistry

David P. Adams. *The Greatest Good to the Greatest Number: Penicillin Rationing on the American Home Front, 1940–1945.* (American University Studies, 9:95.) New York: Lang, 1991.

Ekkehard Höxtermann. "Berliner Botaniker in der Geschichte der Biochemie." *Mitteilungen der GDCh, Fachgruppe Geschichte der Chemie* No. 7 (1992), 20–33.

Susan E. Lederer. "Political Animals: The Shaping of Biomedical Research Literature in Twentieth-Century America." *Isis* 83 (1992), 61–79.

Giorgio Semenza; Rainer Jaenicke, eds. *A History of Biochemistry: Selected Topics in the History of Biochemistry: Personal Recollections* (Comprehensive Biochemistry, 37). New York: Elsevier Science Publishers BV, 1990. Includes recollections by Henryk Eisenberg, Herman M. Kalckar, and Max Perutz.

Understanding Our Genetic Inheritance: The U.S. Human Genome Project—The First Five Years, FY 1991–1995. NIH Publication no. 90–1590, April 1990. Available from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

T. Wieland; M. Bodanszky. *The World of Peptides: A Brief History of Peptide Chemistry.* Berlin / New York: Springer-Verlag, 1991.

Inorganic, Physical, and Theoretical Chemistry

R. F. Barrow; C. J. Danby. *The Physical Chemistry Laboratory: The First Fifty Years, 1941–1991.* Oxford: Physical Chemical Laboratory, 1991.

Michael Chayut. "J. J. Thomson: The Discovery of the Electron and the Chemists." *Annals of Science* 48 (1991), 527–544.

Conference on Chemical Research XXXIV: Fifty Years With Transuranium Elements. Houston, Texas: Proceedings of the Robert A. Welch Foundation, 1990.

Thomas Hapke. *Die Zeitschrift für physikalische Chemie: Hundert Jahre Wechselwirkung zwischen Fachwissenschaft, Kommunikationsmedium und Gesellschaft.* Herzberg, Germany: Verlag Traugott Bautz, 1990.

Russell Harvey. "Fire, Phosphorus, and Matchsticks." *Philatelica Chimica et Physica* 13 (1991), 99–106.

Sydney Ross. "Faraday Consults the Scholars: The Origin of the Terms of Electrochemistry." Pages 126–172 in *Nineteenth-Century Attitudes: Men of Science.* Boston: Kluwer Academic Publishers, 1991.

John T. Stock. "Robert Behrend's Foray into Electrochemistry." *Journal of Chemical Education* 69 (1992), 197–199.

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Constantine of Pisa. *The Book of the Secrets of Alchemy,* trans. and ed. **Barbara Obrist.** New York: E. J. Brill, 1990.

Allen G. Debus. *The French Paracelsians: The Chemical Challenge to Medical and Scientific Tradition in Early Modern France.* New York: Cambridge University Press, 1991.

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T. H. Levere. "Lavoisier: Language, Instruments and the Chemical Revolution." Pages 207–223 in *Nature, Experiment, and the Sciences: Essays on Galileo and the History of Science in Honour of Stillman Drake,* ed. T. H. Levere and W. R. Shea. Dordrecht / Boston: Kluwer Academic, 1990.

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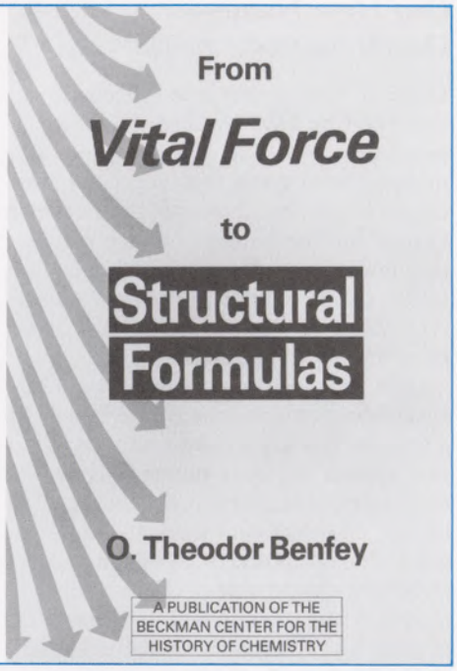
Anne Büchler; Rolf Schumacher; Stephan Kellner, eds. *Die Nachlässe von Martius, Liebig und den Brüdern Schlagintweit in der Bayerischen Staatsbibliothek.* Wiesbaden: Otto Harrassowitz, 1990.

Colin A. Russell. "Records of Chemistry: Combustion or Conservation?" *Bulletin for the History of Chemistry* No. 9 (Spring 1991), 3–7. The 1990 Dexter Address.

From Vital Force Reprinted by CHF

Theodor Benfey's *From Vital Force to Structural Formulas,* first published by Houghton Mifflin in 1964 and reprinted by the American Chemical Society in 1975, is back in print and available from the Chemical Heritage Foundation for $15. Using extended passages from the original papers of Friedrich Wöhler, Justus Liebig, Jean-Baptiste-André Dumas, Charles Frédéric Gerhardt, Auguste Laurent, Alexander William Williamson, Edward Frankland, Archibald Scott Couper, and Friedrich August Kekulé, the book traces the transformation of organic chemistry from 1800 to Kekulé and Couper's development of the structural theory and points to major gaps in the theory that were filled by later chemists.



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Tetsuo Shiba. "Organization and Activities of the Beckman Center for the History of Chemistry" (in Japanese). *Kagakushi* 19 (1992), 50–51.

Our New Name—Our New Logo

Chemical Heritage: the title reflects not only the Chemical Heritage Foundation's new name but its purpose: to articulate the ongoing significance of the chemical sciences. News of the Beckman Center and the Othmer Library will be prominent in its pages, as will news of CHF's public outreach programs. *Chemical Heritage* will also continue to report on events throughout the world.

CHF's logo is three fused hexagons, each inscribed with one of the initials in a square. The logo's nonlinear fused-ring system is that of phenanthrene, a close relative of anthracene, the first known chemical with three fused hexagons. Phenanthrene is an essential structural constituent of cholesterol, steroids, and hormones. Louis Fieser's classic "The Chemistry of Natural Products related to Phenanthrene" (1936) attests to the structure's importance.

The square ground defining each letter takes us back to a much earlier stage of our chemical heritage—the figure often used to depict Aristotle's four elements, earth, air, fire, and water.

Participants in the history of chemistry institute visited the Chemical Heritage Foundation, where they were welcomed by CHF's associate director Laurence Friedman (below) and guided to historical treasures in the vicinity (right). Courtesy of Alice Veyvoda.

CHF—*continued from page 1*

Chemical History (OLOCH)—a product in part of the visionary generosity of Donald F. Othmer—will increasingly serve as an "information center," underpinning all Foundation activities. OLOCH will also be a resource for the media, the chemical community, and the world at large. In this it displays the third facet of CHF activities: public outreach. Joseph A. Dixon, chairman of CHF's finance committee, notes: "Our public outreach programs—examples are our traveling exhibits, publications, and workshops for high-school teachers—offer a highly cost-effective use of the chemical community's resources."

While CHF programs may be grouped under three heads—BCHOC, OLOCH, and public outreach—CHF facilities are all on one site. Soon that site will be the magnificent chapel and deanery of the former Philadelphia Divinity School at 42nd and Spruce Streets, on the campus of the University of Pennsylvania (see story on page 9).

To deploy our chemical heritage—to use our proud past to shape a fine future—necessarily requires financial resources commensurate with the importance of the task. John C. Haas, chairman of CHF's Othmer Challenge Committee, is "confident that we shall secure the 'bricks and mortar' necessary to house CHF, thanks to the example and generosity of individuals like Arnold Beckman and Donald Othmer." Finding the funds to underwrite the Foundation's operations requires a broad-based strategy—now under the aegis of John W. Eckman, chairman of CHF's overall Development Committee. "We expect that all the constituencies in the chemical community—corporations, associations, individuals, and foundations—will play appropriate roles," he notes. "We've been delighted by the experience of our first years. We believe that with each passing year our chemical heritage constitutes an ever-growing resource. Our task is to use that resource in ways that respond to our growing opportunities—to put the past to work in service of the future."

CHF WORKSHOP—*continued from page 1*

early published Christmas lectures (1827–28) from his handwritten notes, and at two closing sessions they presented the lectures as Faraday might have given them. Pairs of teachers also prepared biographies of notable chemists, emphasizing what might be useful in classroom presentations. For another module, to illustrate the dynamic nature of chemistry, the Othmer Library shipped to Princeton its collection of chemistry texts published over the last hundred years. The teachers used them to trace how various chemical techniques and concepts were introduced and modified as the decades passed.

Among the mentors on tap at the workshop were the computer expert Paul Schatz (University of Wisconsin) and the Nobel laureate Roald Hoffmann (Cornell), who looked at the concepts of pure and impure from the perspectives of science and some religious traditions. In addition, Mary Virginia Orna (College of New Rochelle) spoke on medieval pigments, Chem Source materials for experienced teachers, and crossword puzzle construction; Charles C. Gillispie (Princeton) spoke on the historiography of science; and Hubert N. Alyea (Princeton) gave an imaginary tour of Princeton that included encounters with Albert Einstein and other notable residents.

Between the lectures each morning the teachers presented their favorite demonstrations, from magic tricks to home-made cloud chambers and the secret of the absorbing power of disposable diapers. Group excursions to varied "chemical" locations rounded out the workshop—to the facilities of Merck & Co., Inc., the Priestley House in Northumberland, and the Chemical Heritage Foundation. The last, on 10 July, coincided with the opening of the exhibit "Chemistry Imagined" (see page 25).

NALCO—*continued from page 3*

covering 1953 through early 1980. The set includes employee portraits, picnics, sporting events, banquets, and company facilities, though most of the photos are of research tests and samples.

A Corporate History and Archives project was begun in January 1989. The goals were to produce a book on the history of Nalco, establish a functioning archives, and develop historical exhibits. An aggressive oral history program was undertaken involving retired and current employees. Transcripts of these interviews proved a valuable resource for the book, and they are now deposited in the archives. The history took over three years to complete; it has been submitted to management for approval.

The archives have proved invaluable throughout the company—to the Legal, Corporate Communications, Administration, and other departments as well as the Marketing and Research Groups. Historical information has been gathered there to use in speeches generally and at employees' anniversary, service award, and retirement celebrations; to verify the company's marketing slogans; and to create time lines of the history of the company's involvement in specific industries. Archival pictures and artifacts have been incorporated in customer presentations and exhibits.

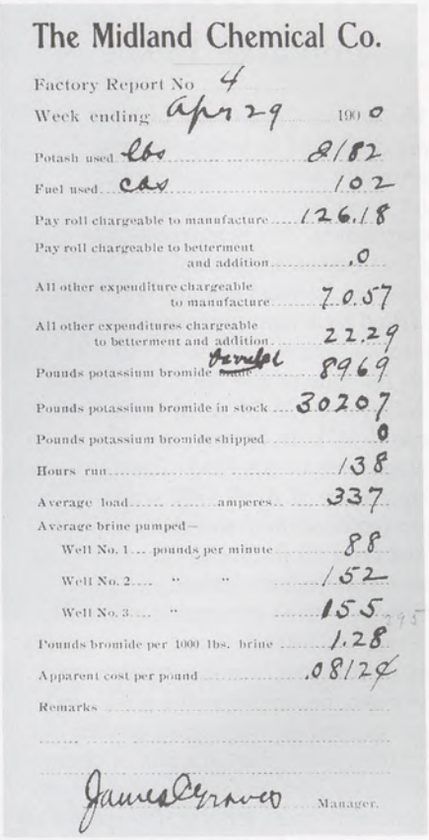
The Nalco archives are managed by the Corporate Communications Department. Inquiries should be directed to the company's corporate office at One Nalco Center, Naperville, IL 60563.

ANN FRANCZYK
Nalco Chemical Company

Dow's Early Years

The design of a company's cost-accounting system can both influence and reflect company attitudes toward research and marketing, as a recent study of the Dow Chemical Company shows. In the 1890s a struggle took place among the company's first stockholders over whether the company should simply live off Herbert Dow's initial invention of a new electrolytic process for making potassium bromide, benefiting from the high prices charged by an existing bromine cartel, or invest in research on and marketing of new products. Herbert Dow argued for the latter course. His views were eventually adopted early in this century, when Dow broke with the bromine cartel and created an organization that could support continued innovation and mass production.

Once Herbert Dow wrested control of the company from other investors and pushed forward his innovative strategy, the company began to use accounts in its management. During its earlier incarnations as the Midland Chemical Company and then the Dow Process Company, the firm collected almost no cost information regularly. Instead, the general manager filed a weekly statement of his own "personal account" with the company's treasurer, as though he were another of the firm's outside suppliers. When the Dow Chemical Company was formed in 1897, this general manager's account was replaced by new reports that gave company management information about the quantity and quality of output, as well as measures of cost and efficiency. These data were used by plant management to make decisions about what and how much to produce and how to go about it as well as by the company's board of directors to advise and compensate Dow himself. In 1900 the company introduced one of the first profit-sharing plans in U.S. history to include all company personnel. This tool further motivated employees to improve quality and cut costs and encouraged long-term employment with the firm. The introduction of these new management techniques, some borrowed from other firms and others developed by Dow itself, created incentives for technological change and prepared the firm for the challenges of growth during the twentieth century.



The Midland Chemical Co.

Factory Report No 4
Week ending Apr 29 1900

Potash used lbs	8182
Fuel used cds	102
Pay roll chargeable to manufacture	126.18
Pay roll chargeable to betterment and addition	.0
All other expenditure chargeable to manufacture	7.057
All other expenditures chargeable to betterment and addition	22.29
Pounds potassium bromide made (Bromide)	8969
Pounds potassium bromide in stock	30207
Pounds potassium bromide shipped	0
Hours run	138
Average load ... amperes	337
Average brine pumped—	
Well No. 1 ... pounds per minute	88
Well No. 2 ... " "	152
Well No. 3 ... "	155
Pounds bromide per 1000 lbs. brine	1.28
Apparent cost per pound	.0812¢
Remarks	

James Ferrier Manager.

An early weekly report of the Dow Chemical Company (29 April 1900) shows chemical output and provides data for analyzing cost and efficiency. Dow apparently could make a pound of potassium bromide for eight cents. Courtesy Post Street Archives.

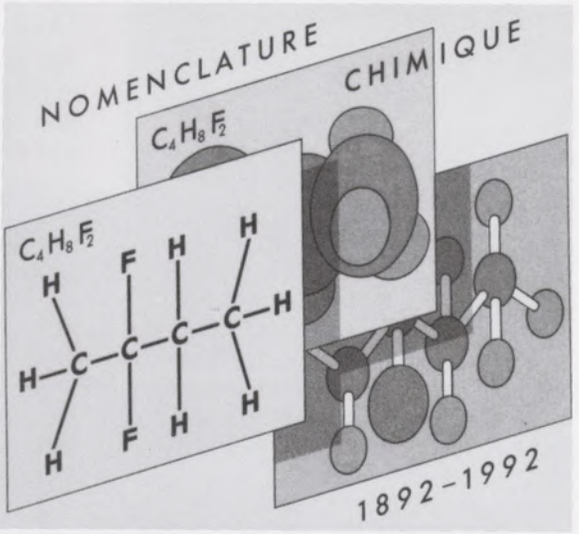
Nalco Waterlabs were installed in railway stations so that the engineers could determine the condition of the steam locomotive boiler water. Here a Nalco service representative (right) reviews product test records with a maintenance crew.

MARGARET LEVENSTEIN
University of Michigan

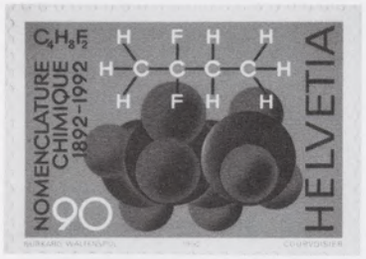
Drawn from Margaret Levenstein, "Information Systems and Internal Organization: A Study of the Dow Chemical Company, 1890–1914" (dissertation, Yale University Department of Economics), based on materials in the Herbert and Grace Dow Collection, Post Street Archives, Midland, Michigan.

CONFERENCE REPORTS

Centennial of 1892 Geneva Conference Celebrated



The Swiss postal authorities issued a commemorative envelope and stamp for "Nomenclature Chimique 1892–1992" that depict 2,2-difluorobutane.



The Geneva Conference of April 1892 was convened in response to the internationally acknowledged need for clear and unambiguous naming of chemical compounds. The hundredth anniversary of that first international conference devoted to chemical nomenclature was marked by a commemorative symposium, "Organic Chemistry: Its Language and Its State of the Art," in Geneva, Switzerland, 22–24 April 1992, with emphases on both history and current developments in the field. The Geneva Conference of April 1892 was a significant focus of the historical presentations, and its results clearly still guided those concerned with ongoing research in various areas of organic chemistry.

Over 400 attended and were quickly drawn into the commemorative spirit of the event by an extensive poster exhibition focused on the earlier conference. Included were photographs of chemists associated with the conference, reproductions of their letters, newspaper accounts, and handwritten minutes. One newspaper reported the seating at the official banquet in 1892 at the Hotel Metropole, where the banquet for the 1992 meeting was also held.

The first lecture of the symposium, "Organic Nomenclature: The Geneva Conference and the Following Fifty Years," by James G. Traynham, traced the development of standards for organic nomenclature from the late nineteenth century through the 1930s. He emphasized the evolution of the rules for naming compounds and the intellectual challenge of developing the rules of nomenclature. To sum up: "Better nomenclature means better communication means better chemistry."

Following this historical overview, the thirteen remaining papers focused instead on activities in which the speaker was a principal participant. Kurt L. Loening (Chemical Abstracts Service, retired), active in the IUPAC Commission on Nomenclature of Organic Chemistry (CNOC) since 1961, spoke on "Organic Nomenclature: The Geneva Conference and the Second Fifty Years." His personal observations included brief accounts of how his interest in languages, stimulated by his emigration from Germany as a teenager in 1937, led to his unplanned career in chemical nomenclature; recollections of the personalities of the CNOC participants, which had significant influence on the commission's work; and candid opinions about the desirability and efficacy of various rule changes. He also noted the indebtedness of the worldwide chemical community to private institutions, such as industries, chemical societies, the Chemical Abstracts Service, and the Beilstein Institute, which have given significant financial support to IUPAC through the intensive unpaid involvement of their employees in the work of the nomenclature commissions.

"Forty Years of Ferrocene," by Jack D. Dunitz (Eidgenössische Technische Hochschule, Zurich) was a fascinating mixture of history, contemporary science, and nostalgia. Dunitz was originally highly skeptical about the structure proposed by R. B. Woodward and set about to disprove it by X-ray crystallography studies; instead he confirmed it and was responsible for its being called a "molecular sandwich."

After pointing out that the names of many of the Geneva Conference delegates have become familiar as designations of important organic reactions, Vladimir Prelog (ETH) gave a highly personal and delightful account, "My 'Nomenclature Years.' " His keen sense of humor was much in evidence. He discussed the evolution of the Cahn-Ingold-Prelog sequence rules for *R* and *S* specifications of configuration and the nature of his interaction with the two Englishmen who developed the system with him. To the delight of the audience, Prelog included a slide of R. S. Cahn working at his desk in front of a mirror, showing "both R. Cahn and S. Cahn." The original paper was published in 1956 in *Experientia* (a rather new journal) after being rejected by the "usual journals." Robert Robinson condemned the proposals as altogether wrong, to which Prelog responded that a convention can be accepted or rejected, but it cannot be wrong; Robinson then asserted that, if not wrong, it was entirely unnecessary.

The language of organic nomenclature in different contexts was discussed by M. Volkan Kisakürek (editor of *Helvetica Chimica Acta* and chair of the committee that organized the symposium), who spoke on chemistry journals; Marjorie C. Caserio (University of California, San Diego), who noted how important language is in the teaching of chemistry, since unsystematic nomenclature can be familiar to chemists but frustrating to beginning students; and Edward Godby (Laboratory of the Government Chemist, U.K., retired, and current secretary of CNOC), who discussed nomenclature in the government laboratory.

Six chemists presented lectures on their current research, and Jack H. Stocker (University of New Orleans) closed the symposium with a mixture of lighthearted and more serious predictions about "Tomorrow's Organic Nomenclature." A volume of the invited lectures will be published later this year by Verlag Helvetica Chimica Acta.

Just before the symposium, on 21 April, the Swiss Chemical Society and the Association of Swiss Chemists joined to form the New Swiss Chemical Society. At the ceremony the Geneva Société de Physique et d'Histoire Naturelle awarded its annual Marc-Auguste Pictet Prize for an outstanding work by a young researcher in history of science to Diane L. Barkan (California Institute of Technology) for her article

"Walter Nernst and the Transition to Modern Physical Chemistry," and its annual Marc-Auguste Pictet Medal for a career of accomplishment in history of science to George B. Kauffman (University of California, Fresno).

The Geneva Conference of 1892 was worthy of a centennial celebration. Organic nomenclature and the chemistry it helps communicate are unfinished business and inseparable.

JAMES G. TRAYNHAM
Louisiana State University

Berlin Celebrates Hofmann Centennial

August Wilhelm von Hofmann (1818–1892) was uniquely the Anglo-German colossus of organic chemistry. As Heinrich Caro said in his 1892 history of the dyestuffs industry, Hofmann was the loyal gardener who for fifty years tended the soil of the great tree of academic and industrial chemistry.

Despite a public-sector strike in former West Berlin that made travel to the chemistry buildings of the Humboldt University in former East Berlin awkward, some 150 chemists and historians of chemistry assembled on 5 and 6 May 1992 to commemorate Hofmann's death. Sponsored by the reunited halves of the Deutsche Chemische Gesellschaft (which Hofmann founded in Berlin in 1867) and the Royal Society of Chemistry (of which he had been an extraordinarily active member during his twenty years in London), the meeting soon made it clear that in 1992 this cosmopolitan chemist symbolizes both the unity and the internationalism of chemistry.

The first day was devoted to a visit to Hofmann's grave (the present headstone replaces a grander monument destroyed during the war) and general lectures on Hofmann's influence on British and German chemistry (C. A. Russell and C. Meinel), the state of the German chemical industry in Hofmann's day (L. Burchardt) and the image of chemistry in literature—an amusing lecture demonstration by O. P. Krätz and his wife. The following day the meeting split into parallel sessions. In the first, chemists reviewed the progress made in those parts of chemistry to which Hofmann had particularly contributed. In the second, chemical historians investigated Hofmann's English years (W. H. Brock and G. K. Roberts); the state of chemistry in Prussia when Hofmann returned in 1865 (H. W. Schütt); Hofmann's role in perpetuating the Liebig tradition (R. Zott and S. Strbánová); the literary and medical milieu in Berlin, Hofmann's liberalism, and his opposition to anti-Semitism (G. P. Schiemenz and H. Fink); his creation of the German Chemical Society (M. Donke-Müller); his activities as a jury member of world fairs (E. Vaupel); and his support for the reform of chemistry teaching in high schools (H. Scholz). Finally, W. J. Hornix and J. A. Johnson reviewed Hofmann's strategic importance to relations between academics and industry in the British and German dyestuffs industries.

August Wilhelm Hofmann in Berlin, in his private laboratory attached to the university, 1870.

The conference proceedings will be published by Verlag Chemie. The meeting generated an exhibition catalogue, *Chemie und Chemiker in Berlin: Die Ära August Wilhelm von Hofmann 1865–1892*, edited by Michael Engel and Brita Engel of the Freie Universität, and a monograph, *August Wilhelm von Hofmann (1818–1892)* by Fritz Welsch. Articles on Hofmann also appeared in the May issue of *Education in Chemistry*, including one on Hofmann's impact on chemical education by Tony Travis of the Edelstein Center and Theodor Benfey of CHF. The reporter rejoiced that Hofmann's library, taken to Russia after the fall of Berlin in 1945, has been returned unharmed to the care of the Organic Chemistry Department of the Humboldt University.

W. H. BROCK
University of Leicester

Plastics Museum Opens Its Doors

After sixteen years of consultation, planning, and finally construction, the dream of a National Plastics Center and Museum has become a reality. In preparation the museum's vice-president, Jack Keville, made many a visit to CHF. The grand opening was held on 14 June at the former Lancaster Street School House of Leominster, Massachusetts. The building, for which the museum paid one dollar, has been totally transformed, and the interior redesigned by Thomas Wong of Boston's Museum of Fine Arts. No better site could have been found than Leominster, widely considered the cradle of the plastics industry. Here in 1868 John Wesley Hyatt invented and developed celluloid, a cellulose nitrate material suitable for volume production, as a substitute for the ivory on piano keys.

In the museum's initial phase the exhibits, many of them interactive, are located at street level. Visitors can make their own souvenirs by operating a Dow Chemical Company molding machine. Children can satisfy their architectural yearnings with a vast collection of construction materials donated by Lego, headquartered in Denmark. The B. W. Doyle Historical Gallery surveys the astounding strides made by the plastics industry since Hyatt's discovery; it also shows pictures of members of the Plas-

Continued on next page

VISITORS & EVENTS

Visitors

▲ **Philip M. Jacobs,** senior vice president of **Huntsman Chemical Corporation,** visited CHF to explore ways in which the corporation and the foundation can support each others' activities. The chief executive officer of the corporation, Jon M. Huntsman, founded his company only ten years ago in 1982 in Salt Lake City, Utah. He is said to have brought it to its present eminence through his "appetite for calculated risk." He recently established the Center for Global Competitiveness at the Wharton School of the University of Pennsylvania, of which he is a trustee. Huntsman is a member of the Chemical Heritage Foundation's Advisory Board.

Jacobs was guided on a tour of the Foundation by John W. Eckman, James B. Bohning, Irene I. Lukoff, and John C. Haas, who also showed him the university's Edgar F. Smith collection.

▲ **H. Steffen Peiser,** former head of the International Division of the U.S. National Bureau of Standards, made a return visit, accompanied by **Thomas Murphy** and **Tyler B. Coplen.** They brought for deposit in the CHF archives the papers accumulated by the international headquarters of the Commission on Atomic Weights and Isotope Abundances of the International Union of Pure and Applied Chemistry. These now join the papers of the U.S. branch of CAWIA. Peiser has been active at both levels of CAWIA for many years.

▲ **James F. O'Brien** of Southwest Missouri State University returned to conduct further studies on mercury poisoning. He presented findings on poisoning in Faraday at the ACS Faraday Symposium in 1991. O'Brien treated the CHF community to portions of the lecture he gave when on tour for the ACS, "Famous Mad Hatters." He gave evidence of mercury poisoning in Isaac Newton; the German chemist Alfred Stock, who worked on silicon, boron, and mercury; Charles II of England; and the man who shot John Wilkes Booth, Thomas "Boston" Corbett. The evidence for Newton's being a mad hatter, a nuclear-activation analysis of his hair, was written up in *Science.*

▲ **Herbert T. Pratt,** a retired Du Pont scientist and frequent visitor to CHF, represents the American Association of Textile Chemists and Colorists on the Board of Directors of the Chemical Heritage Foundation. He has initiated a column, "I Remember When," in *Textile Chemist and Colorist,* AATCC's journal, in which readers can share memories of their work with other readers. In its April issue A. Durfee Damon tells of the manager of a mill who, when asked how things were going at the plant, replied "Mr. Damon, right now, I am as confused as the little boy who has just dropped his chewing gum in the hen house."

Scholars and Travel Grants

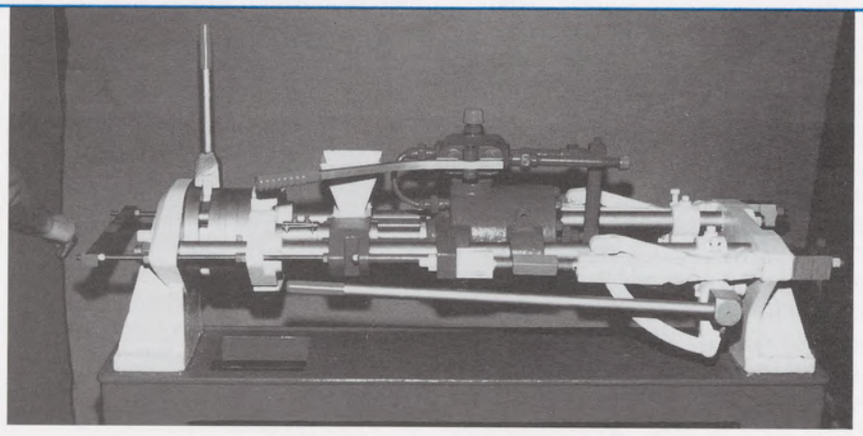
▲ **Yasu Furukawa,** historian of chemistry at Tokyo Denki University, has come to CHF as a visiting scholar for the 1992/93 academic year to continue his studies on the history of polymer chemistry. Furukawa, on the faculty of Yokohama College of Commerce for many years, is one of the leaders of the Japanese history of chemistry community and of its journal *Kagakushi.* In 1989 he published *Kagaku no Shakaishi,* a major social history of science. He was a visitor with us earlier during our work on the polymer project. He wrote his doctoral thesis, "Staudinger, Carothers, and the Emergence of Macromolecular Chemistry," under Mary Jo Nye of the University of Oklahoma.

▲ The longevity of chemical practices, compared with those of physics and biology, was the subject of the travel-grant studies of **Stephen J. Weininger** of Worcester Polytechnic Institute. The preparation of chemical elements, the order in which they are introduced, and such basic methods as distillation, sublimation, and crystallization persisted with remarkably little change from the directions given by Michael Faraday and Humphry Davy until well into the twentieth century.

▲ Another travel grant visitor, environmental historian **Edmund Russel** of the National Museum of American History, shared with us his reconsideration of the "miraculousness" of DDT in World War II. DDT was first synthesized in 1874 by a graduate student in Germany, Othmer Zeidler. Discovery of its insecticidal properties gained Paul H. Müller the Nobel Prize in 1948. Russell explored DDT's meteoric rise in popularity in spite of the availability of effective alternatives and questions from the start regarding its safety.

Our Far-Flung Correspondents

▲ **Harry J. Litsch** of Bethlehem, Pennsylvania, a former president of the American Electroplaters and Surface



A hand-operated Foster-Grant plastic injection molding machine from 1934 was among the earliest to produce a commercially marketed product—combs.

PLASTICS MUSEUM—*continued from page 23*

tics Hall of Fame, whose national home the museum soon hopes to become. A special gallery highlights environmental concerns that challenge the industry.

Valerie Wilcox, newly appointed executive director of the museum, entertained visitors during the week-long opening festivities with presentations characterized by humor, historical insight, and concern for improved education in science and technology. Her spectacular demonstrations included synthesizing nylon and carrying out other plastics processes.

Finishers Society (AESF), carries out teaching assignments for AESF. For that purpose he wrote to request a copy of our new electrochemistry brochure; he then sent us AESF's *Diamond Jubilee History, 1909–1984*. Formerly the American Electroplaters' Society, AESF expanded its name shortly after its jubilee. The society now has about 8,700 members; its executive director is J. Howard Schumacher, Jr. AESF's headquarters building, in the Central Florida Research Park in Orlando, was completed shortly after the jubilee celebrations.

▲ **The Gesellschaft für Unternehmensgeschichte,** Bonnerstrasse 211, 5000 Cologne, Germany, sent us the March 1991 issue of their *Zeitschrift für Unternehmensgeschichte*. As part of its coverage of the history of business and industry, the newsletter reports on archives, conferences, publications, museums, and oral history programs.

Conversazioni

▲ At an evening Conversazione **Peter Benoliel** described his life's work and the history of the Quaker Chemical Company, which he heads. He is now also chairman of the Philadelphia Orchestra Development Committee and of the Federal Reserve Bank of Philadelphia.

Benoliel graduated from Princeton, then worked as a chemist for Quaker Chemical, following his father and grandfather into the chemical industry. His grandfather Solomon Benoliel, an electrochemist, founded International Chemical Company, for which his two sons also worked until 1930, when they transferred to what was then Quaker Oil Products. The sons took over Quaker Oil the following year. In 1966 Peter Benoliel became president of the company, now Quaker Chemical, and in 1980 he became its chairman.

Joseph Schmuckler of Temple University and John C. Haas of Rohm and Haas with Conversazione speaker Peter Benoliel of Quaker Chemical Company.

Quaker Chemical manufactures cleansing and protecting agents for the textile, metals, and auto industries; it established a paper division in 1969. Since the 1960s it has been expanding globally and now has branches in Europe, South America, Asia, and Australia. Benoliel several times emphasized the strong ties of loyalty that bind the company and its employees.

▲ At a spring Conversazione **Arnold Frankel** of the Aceto Corporation told how he founded his specialty and fine-chemicals company in 1947, to secure chemical intermediates in this country for sale here and abroad. Because of Europe's needs after the war, extensive shipments of chemicals were sent there, financed to a large extent by the Marshall Plan. By the early 1950s shortages in the United States led instead to explorations in Great Britain and on the Continent for chemicals that could be imported. By the 1960s Japanese manufacturers of organic chemical intermediates were bringing their products to the States via Aceto. Frankel visited China's Canton fair in 1975—and Chinese imports were added to Aceto's offerings. Aceto also acquired companies such as Inmont and Pfalz & Bauer, and it now even carries out a certain amount of in-house manufacturing.

Frankel surveyed the way the U.S. chemical industry was transformed as the domestic economy gradually became global. He described the changing export and import patterns and the crucial role played by trading firms.

During the early hectic years of the company, Frankel and Seymour Mann, Aceto's cofounder, even managed to pursue graduate work. Frankel, whose first graduate courses in chemical engineering were at the University of Pennsylvania, chose Brooklyn Polytechnic Institute (now Polytechnic University), where Donald Othmer was teaching.

Torrence-Hoffmann Exhibit Visits CHF

Chemistry Imagined, the exhibit of collages by Vivian Torrence with accompanying poetry and prose commentaries by Roald Hoffmann, went on exhibit at the Chemical Heritage Foundation after a stop at the New York Academy of Sciences. The exhibit is at the National Academy of Sciences in Washington from September through December 1992.

"Beauty, elegance, deep understanding are sought by chemists just as much as they are by artists," in Hoffmann's view; and the exhibit's thirty panels, on themes ranging from the four Greek and the five Chinese elements to patterns, steps and processes, radium, and "the crystal scale," explore and exemplify this common search.

Torrence's talk at the opening of the exhibit, "Chemistry Imagined: A Collaboration of Art and Science," was attended by the high school teachers who took part in the Woodrow Wilson–CHF summer institute on history of chemistry in Princeton.

Chemistry Imagined will be available soon in published form from the Smithsonian Institution Press.

Thelma McCarthy (CHF) introduced the artist, Vivian Torrence, who spoke to participants from the history of chemistry institute and other guests.

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Friends (1 July 1991–30 June 1992)

The Chemical Heritage Foundation enjoys the support of many benefactors at home and abroad who donate time, advice, art, books, historic apparatus, and other resources. We list below those who have contributed since publication of our last list (see issue 9:1, Spring 1992, p. B-12); if we have inadvertently omitted your name, please let us know. This list is our public acknowledgment of the help of the Friends of the Chemical Heritage Foundation and a token of our appreciation for their continued support.

Benefactors contributed $1,000 or more, Patrons from $500 to $999, Sponsors from $100 to $499, Colleagues from $35 to $99, and Contributors up to $34. Listed also are those individuals who donated books and other materials to CHF's collections. If you would like to join the Friends of the Chemical Heritage Foundation, please write to us at 3401 Walnut Street, Philadelphia, PA 19104-6228.

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MEETINGS

History of Science Society Annual Meeting, Washington, D.C., 26–30 December 1992.

Joint meeting with the American Historical Association.

205th ACS National Meeting, Denver, Colorado, 28 March–2 April 1993.

The HIST program includes a centennial symposium on coordination chemistry. HIST Program Chair: M. D. Saltzman, Department of Chemistry, Providence College, Providence, RI 02918-0001; (401) 865-2298.

AIChE Spring National Meeting, Houston, Texas, 28 March–11 April 1993.

Electrochemical Society Spring Meeting, Honolulu, Hawaii, 16–21 May 1993.

ASBMB National Meeting, San Diego, California, 30 May–3 June 1993.

ASMS Annual Meeting, Las Vegas, Nevada, 6–11 June 1993.

AACC Annual Meeting, New York, New York, 11–15 July 1993.

206th ACS National Meeting, Chicago, Illinois, 22–27 August 1993.

The HIST program includes a symposium, "C. K. Ingold, 1893–1970: Master and Mandarin of Physical Organic Chemistry," organized by Derek A. Davenport, Department of Chemistry, Purdue University, West Lafayette, Indiana, 47907; (317) 494-5465; and M. D. Saltzman. Titles of papers are due by 1 April 1993. To submit general papers contact the program chair, M. D. Saltzman, at the address given above.

XIXth International Congress of History of Science, Zaragoza, Spain, 22–29 August 1993.

AATCC International Conference and Exhibition, Montreal, Canada, 3–6 October 1993.

Electrochemical Society Fall Meeting, New Orleans, Louisiana, 10–15 October 1993.

Society for the History of Technology Annual Meeting, Washington, D.C., 14–17 October 1993.

AIChE Fall National Meeting, St. Louis, Missouri, 7–12 November 1993.

A special history program focusing on biochemical engineering on 10 November will include a plenary lecture, morning and afternoon sessions, and a presentation on oral history by James J. Bohning. The CHF booth and the traveling exhibit "Structures of Life" will be on display.

Bicentennial Commemoration of the Death of Antoine Lavoisier, Paris, France, 3–6 May 1994.

Included will be a visit to Lavoisier's laboratory, hosted by the Musée des Techniques, and a visit on 6 May to Lavoisier's former holdings in the Blois region, which will focus on his agronomic and political activities. For details contact Madame Michèle Goupil, Bicentenaire Lavoisier, Académie des Sciences, 23 Quai Conti, 75006, Paris, France.

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